Benchmarks for Unlisted Infrastructure: Part I

This article provides a broad overview of available benchmark families for the infrastructure asset class and discusses associated shortcomings. Based on a thorough review of practices of global investors active in the infrastructure asset class, it finds that different investors have different goals for their infrastructure portfolios, leaving no single “right” way to benchmark the asset class. This article sets forth eight general principles for benchmarking and valuing unlisted asset classes, along with specific recommendations for infrastructure in particular. Implications for various groups within an investment organization are discussed. Future research should examine how the infrastructure benchmark can be adjusted with appropriate premiums for leverage, country, capex, and other factors.

Since the 2008 global financial crisis, institutional investors have increasingly questioned the integrity of financial assets sold by Wall Street and shown increasing interest in replacing these allocations with investments in real assets, especially in infrastructure. According to a 2009 survey by Russell Investments, institutional investors globally plan to increase infrastructure allocations from 0.3 percent to 1.4 percent by 2012.

The infrastructure asset class consists of a heterogeneous collection of core physical assets and essential service businesses that support an economy’s day-to-day functioning. Most private investment in this area has gone into civil infrastructure, which is generally defined to include the communications, energy, transportation, and water and waste sectors. In the United Kingdom and other European markets, significant private investment has also gone into social infrastructure, including schools, government buildings, and health care facilities. Over the last 20 years, investors have begun to recognize infrastructure as a distinct asset class with its own unique set of investment characteristics. Long-term steady cash flows and inflation protection make infrastructure investments particularly appealing to pensions, endowments, and insurance companies with defined liabilities. This article is written with the assumption that readers are familiar with the risk, return, and cash flow characteristics of the infrastructure asset class.¹

Despite growing interest in the infrastructure asset class, no standard exists for benchmarking the performance of unlisted infrastructure investments. In reviewing and refining such an approach, we examine three key questions:

- What benchmarks do institutions use currently to assess the relative performance of their unlisted infrastructure holdings?
- What are the strengths and weaknesses of various benchmarking approaches? Is a standard emerging in the industry?
- Can current practices for benchmarking and valuing unlisted infrastructure be improved in any way? How would improvements best be implemented?

To address these questions, we organized this article into three sections. First, we review the various benchmark families that institutions use today for infrastructure investments and examines the shortcomings of each. Next, we propose a set of general principles for benchmarking
and valuing unlisted infrastructure investments, which may also apply to other unlisted asset classes. Finally, we offer specific suggestions to build on current practices in order to refine institutional investors’ approach to infrastructure benchmarking and valuation. The article ends with a discussion of implications of the proposed changes from the standpoint of the chief investment officer, infrastructure team, risk group, and performance group.

To refine its approach to infrastructure benchmarking and valuation, Alberta Investment Management Corporation (AIMCo) conducted a three-week brainstorming, critiquing, and idea refining session. The motivation for this article was drawn from discussions between the authors and others at this session. The analysis is informed by interviews with nine institutions that maintain dedicated infrastructure investment allocations, as well as a review of scholarly literature.

The intended contribution is to improve insight into the complex interplay between benchmark selection and implementation decisions and other interdependent issues within an institutional investment organization, including asset allocation, investment selection, valuation, performance measurement, value-added compensation, risk management, and hedging.

APPROACHES USED IN PRACTICE TODAY

- As the unlisted infrastructure asset class arose, institutional investors experimented with a hodgepodge of approaches to benchmark their portfolios. No standard has emerged yet. Our poll of nine institutional investors showed a diversity of distinct approaches:
  - British Columbia Investment Management Corporation (bcIMC): 8% absolute return with adjustments for asset, country, and currency risks
  - Borealis Infrastructure: Absolute return set at the beginning of the year based on operating plan
  - California Public Employees’ Retirement System (CalPERS): CPI + 5%
  - Caisse du Depot: 50% S&P 500/TSX + 25% S&P 500 + 25% MSCI EAFE Index
  - CPP Investment Board (CPPIB): Calculated on an investment-by-investment basis:
    \[ (w1) \times (CDN \text{ equity return}) + (w2) \times (CDN \text{ bond return}) + (w3) \times (Equity \text{ return of asset currency/country}) + (w4) \times (Bond \text{ return of asset currency/country}) + \]
    Inflation sensitivity + Leverage sensitivity
  - Municipal Employees’ Retirement System (MERS) of Michigan: Barclays Aggregate Bond Index
  - OPSEU Pension Trust (OP Trust): CPI + 5%
  - Ontario Teachers’ Pension Plan (OTPP): CPI + 4% + Sovereign spread (where CPI is based on country and currency of investment)
  - PSP Investments: CPI + Bond return + Equity premium

Overall, two institutions use absolute real return approaches. Two use simple CPI-plus approaches. Two use CPI plus bond and equity premiums. One uses a fixed income index. Finally, three institutions use hybrid approaches, although each with rather different components, weightings, and construction. Our discussions with the various institutions suggest that few are particularly satisfied with their benchmark choice.

WHY THE HODGEPODGE?

The diversity of benchmark approaches reflects a number of factors, including the newness and heterogeneity of the infrastructure asset class, variations in risk–return expectations across institutions, and a lack of widely cited time-series performance data for infrastructure. Several institutions noted a desire for greater benchmark stability when selecting real return benchmarks. Some hybrid approaches may represent an attempt to integrate more of the desired features of infrastructure investing (low volatility, inflation-linkage, cash yield, etc.) into a single composite.

The diversity also reflects the fact that infrastructure investments play different roles in different investors’ portfolios. For example, a recent poll found that fewer than 40 percent of pensions have a unique “infrastructure” allocation. Some plans group infrastructure in with “real assets,” emphasizing tangible physical assets believed to have an intrinsic value, such as gold and commodities, real estate, and equipment; some with “inflation-linked,” emphasizing long-term asset and liability matching; and some with “absolute return,” emphasizing the importance of achieving a net return above other asset classes, usually global equities. Other investors view infrastructure as a subset of “fixed income,” which recognizes the potential to provide predictable income distributions from day one. Yet others have added it in alongside
generating equity-like returns with bond-like risks and serving as a first-order proxy for long-dated liabilities.

**BENCHMARK PERFORMANCE**

Figure 2 presents the cumulative performance of four of the benchmark families discussed above. The figure illustrates that the straight DEX RRB and the CPI + 6% indices generated the lowest volatility and the highest hurdle over the 10-year period ending August 2009, with annualized returns of approximately 8.2 percent and 8.1 percent, respectively. The 50% MSCI World/50% DEX RRB and the UBS Global Utilities and Infrastructure Index generated lower annualized returns, with 4.1 percent and 3.1 percent, respectively. The lower returns are explained by two significant market corrections over the 10-year period, in 2001 and 2008. In addition to generating the lowest hurdle, the UBS Global Utilities and Infrastructure Index also exhibited the highest volatility. The analysis shows that different benchmarks produce quite different return expectations and volatility levels.

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**Figure 1. Risk–Return Continuum for Unlisted Infrastructure Assets**

![Risk–Return Continuum for Unlisted Infrastructure Assets](image)

*Source: Based on authors' analysis.*
Figure 2. Cumulative Historical Performance of Benchmark Families (1999–2009)
NOTES

1. For a more detailed discussion of these topics, see Weisdorf (2007).
2. A survey by Probitas Partners of more than 200 executives from global institutional funds found that nearly 40 percent of investors use dedicated infrastructure allocations. See “Investing in Infrastructure,” summer 2009.
3. The Teacher Retirement System of Texas program has a “real asset” allocation with an intended objective “to contribute favorably to diversification of the Total Fund through exposure to real assets’ low or negative correlation to the Public Markets.” See www.trs.state.tx.us/investments/documents/investment_policy_statement.pdf and www.trs.state.tx.us/about/documents/infrastructure_investing_opportunities.pdf.
4. CalPERS has assigned a benchmark of CPI + 4% for the Inflation-Linked Asset Class and CPI + 5% for the infrastructure component. See: www.calpers.ca.gov/eip-docs/investments/policies/inv-asset-classes/fixed-income/ILAC.pdf.
5. California State Teachers’ Retirement System (CalSTRS) created such a program in 2009, with the stated goal of achieving a target nominal return of 6.5 percent and 6.1 percent standard deviation through allocations to infrastructure and Treasury Inflation-Protected Securities (TIPS).
6. MERS of Michigan created a sub-asset class for infrastructure in its fixed income portfolio.
7. Although we do not present the data, our analysis also found that the UBS Global Infrastructure & Utilities Index is highly correlated with the S&P Global Infrastructure Index, Macquarie Global Infrastructure 100, and Dow Jones Brookfield Global Infrastructure Index. Hence, we chose not to include any of these others.

REFERENCES


Jagdeep Singh Bachher is deputy chief investment officer, change management, at Alberta Investment Management Corporation.
Ryan J. Orr is executive director at Stanford University’s Collaboratory for Research on Global Projects.
Daniel Settel is co-founder and vice president of operations at Zanbato Group, LLC.
Benchmarks for Unlisted Infrastructure: Part 2

The authors provide a broad overview of available benchmark families for the infrastructure asset class and discuss associated shortcomings. They present basic principles as well as more specific recommendations and suggest further research.

Different investors have different goals for their infrastructure portfolios, which leaves no singular “right” way to benchmark the asset class. We discuss the implications of using the different benchmarks for various groups within an investment organization. Additionally, we describe eight general principles for benchmarking and valuing unlisted asset classes and provide specific recommendations for infrastructure in particular. And finally, we briefly highlight areas for future research.

**BENCHMARK STRENGTHS AND WEAKNESSES**

Different benchmark selection choices have different inherent strengths and weaknesses. The Bailey criteria provide a generally accepted framework for assessing benchmark quality (Bailey 1992a). When we apply the six Bailey criteria to assess the quality of the available families of infrastructure benchmarks, we find that all of the benchmark options are flawed—that is, none satisfy all six criteria (see Table 1).

The implication of the available choices is that institutional investors must choose a benchmark with “tolerable imperfections.” The stars in Table 1 depict the Bailey criteria that are fully satisfied; the half-stars indicate criteria that are only partially satisfied. Some of the reasons that benchmarks fail to satisfy the Bailey criteria are as follows:

- The absolute return, CPI-plus-margin, fixed-income-plus-margin, and equity-plus-margin options are all fairly similar in composition, with both a base and margin component. The main shortcomings are that they are not fully “investable” because of the margin component. Nor are they fully “appropriate” relative to manager style biases or “reflective of current investment options” in the unlisted universe. The fixed-income-plus-margin and equity-plus-margin options also face the challenge of being somewhat “ambiguous” because they consist of a large number of components and weights that are generally only fully understood by the mathematician who constructed the index.

- Hybrid benchmarks may combine both equity and debt components in a composite index, which is often done to reflect the fact that infrastructure sits somewhere between debt and equity on the risk-return continuum. However, if an arbitrary margin component is also built-in, then it is not an investable benchmark.

- The custom portfolio benchmark satisfies the largest number of the Bailey criteria, but it still suffers from being composed of listed companies, which is inconsistent with a style focused on unlisted companies and thus does not satisfy the “appropriate” criterion.

- The peer group benchmark is the only benchmark that is fully appropriate and reflective of current investment options (i.e., it is the only one that is drawn from the unlisted universe), but it fails on most of the other scores. It is fairly ambiguous and not necessarily specified in advance (peers and their investments change every year), and it is not at all investable. Furthermore, it can be quite difficult to measure because different peers may have been more aggressive or conservative in marking up their illiquid asset valuations on their books.

- Liability-based benchmarks rank most poorly against the Bailey criteria.
Table 1. Benchmark Quality Scored against Bailey Criteria

<table>
<thead>
<tr>
<th>Bailey's Criteria</th>
<th>Criteria Definition</th>
<th>Absolute Return</th>
<th>CPI + Margin</th>
<th>Debt Return + Margin</th>
<th>Equity Return + Margin</th>
<th>Hybrid Return (e.g., 50% MSCI/50% RBA)</th>
<th>Custom Portfolio Benchmark</th>
<th>Peer Group</th>
<th>Liability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unambiguity</td>
<td>The names and weights of each property or security comprising the benchmark are clearly delineated and understood.</td>
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<td>♠</td>
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<tr>
<td>Investable</td>
<td>The option is available to long active management and simply hold the benchmark.</td>
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<tr>
<td>Measurable</td>
<td>It is possible to calculate the return on the benchmark on a reasonably frequent basis.</td>
<td>♠</td>
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<tr>
<td>Appropriate</td>
<td>The benchmark is consistent with the manager's investment style biases (i.e., consistent with style to focus on private investments).</td>
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<tr>
<td>Reflective of Current Investment Options</td>
<td>The manager has current investment knowledge of the securities that make up the benchmark (i.e., reflective of opportunities in private infrastructure universe).</td>
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<tr>
<td>Specified in Advance</td>
<td>The benchmark can be constructed prior to the start of an evaluation period (formula of calculation/data).</td>
<td>♠</td>
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PROBLEMS WHEN WE SHIFT FROM THE LISTED TO UNLISTED UNIVERSE

Trying to apply benchmarking approaches that were developed in the listed sphere to the unlisted sphere causes many issues and frustrations. There are three sets of problems:

• **Pricing problem.** Benchmarks composed of listed securities (e.g., public index, custom portfolio index, hybrid benchmarks) yield continuous transaction-based pricing. Unfortunately, continuous transaction-based pricing is not available for unlisted markets, rendering most traditional risk and performance assessment techniques ineffective. Moreover, pricing on the listed markets comes with a great deal of short-term volatility, which makes daily, weekly, or quarterly benchmarking meaningless. In response to this pricing dilemma, several institutions have attempted to come up with a benchmark that, based on professional intuition, is viewed as being generally “about right” for infrastructure but does not rely on listed securities. This is probably why so many institutional investors have crafted real return, CPI-plus-margin, and fixed-income-plus-margin approaches to get at the “about 8%” return number that most practitioners intuitively feel is appropriate for the infrastructure asset class. Such benchmarks, however, are not investable (the base part might be, but the margin component is not). Furthermore, such approaches do not solve the coverage problem, which is what we turn to next.

• **Coverage problem.** By definition, the universe of listed investment opportunities is the mirror opposite of the unlisted opportunity set. Figure 1 illustrates this concept, which is called the “coverage problem” (i.e., the listed universe does not “cover” the unlisted universe). Because of this lack of coverage, it is misguided to try to assess a manager’s value-adding in the unlisted sphere by using benchmarks composed of listed securities. Doing so runs the risk of overcompensating a manager
who outperforms the listed markets but underperforms relative to other unlisted managers. Ideally, one would want to assess how an unlisted manager who is overweight on airports and toll roads in Australia had performed relative to other unlisted managers who were overweight LNG terminals and gas pipelines in Qatar, for example. Unfortunately, because of a lack of peer group data characterizing risk-return attributes of the unlisted universe and its subsectors, this assessment is currently difficult or impossible.\textsuperscript{1} If several institutions were to pool data to form a peer group benchmark and were to agree to a consistent valuation methodology, this problem could be lessened.\textsuperscript{2}

- **Analytical toolkit problem.** Most of the analytical toolkits available and in use today for measuring performance originate from the listed side of the market and were developed in the context of listed portfolios. Such concepts as tracking error, active positions, extra-market return correlations, style exposures, risk exposures, and so on (Bailey 1992b) all require continuous transaction-based pricing and require that an investment portfolio is drawn from the wider benchmark universe to be appropriately implemented.

The take-away from this discussion is that it is important to be judicious in applying benchmarks originating from the world of listed securities to unlisted portfolios. As Nesbitt and Reynolds (1997) highlight, “The institutional real estate experience of the late 1980s is a good example of the damage that can result from attempts to evaluate illiquid investments via methods developed for public markets” (p. 85). They go on to argue that “decision tools commonly used for publicly traded stocks and bonds to set asset allocation, measure risk, and evaluate performance are difficult to apply to the private markets.”

**NEEDS AND WANTS IN THE PENSION ORGANIZATION**

Each group within any institutional investment organization has its own needs and preferences, some of which are different from those of other groups. For the purpose of this article, we analyze benchmarks from the perspective of four different groups that are common within such an organization: the CIO, infrastructure team, risk group, and performance group. Each has different day-to-day roles and responsibilities and, therefore, unique perspectives on the benchmark selection and implementation decision (see Figure 2). What is preferred and recommended from the standpoint of one group may be quite different from that of the others (see Figure 3). Some of these differences are discussed below.

- **Within certain limits, the CIO will allocate assets to infrastructure if expected returns exceed the opportunity cost of not investing in a portfolio of public debt and equity. As one CIO describes, “In the absence of attractive opportunities for active management, our partners would simply buy and hold broad-based equity and bond indices.” Therefore, when capital is allocated to unlisted investments,
such as infrastructure, there is an implied trade-off between the returns on infrastructure and the returns on a "default portfolio" of public stocks and bonds. This CIO is thus of the view that at the portfolio level, infrastructure investment performance should be measured against the performance of a client's alternative default portfolio.

- The infrastructure team has a different set of concerns. Not having the luxury to pick and choose between asset classes, and being wholly confined to the universe of infrastructure opportunities, the infrastructure manager is concerned with being able to consistently screen investment opportunities against a reliable benchmark. The infrastructure manager wants to know with confidence that investment commitments that meet or exceed the benchmark will be viewed favorably within the organization in the long run. A benchmark composed of broad stock and bond indices that suits the CIO is not necessarily the best option for the infrastructure manager if it is so volatile that it doesn't provide clear guidance for screening investments on a month-to-month basis. From this standpoint, highly stable real return benchmarks have been more attractive to most infrastructure managers.

- The performance group has perhaps less of a vested interest in benchmark selection and is trained with a broad set of skills to implement a range of benchmark options. Generally, this group is comfortable with absolute return benchmarks, broad public indices, customized portfolio benchmarks, and peer group benchmarks. That said, there may be a slight preference by some in this group toward developing custom portfolio benchmarks in-house, which permits greater professional discretion and builds on methods taught in the CIPM curriculum. There is also recognition of the need to keep performance-measurement activities from becoming too resource intensive.

- Finally, the risk group comes to the benchmarking deliberation from yet another standpoint. The current thinking is to measure portfolio risk by identifying
small baskets of highly comparable listed equity proxies for each of the unlisted investments and to impute the riskiness of each investment both from the volatility of the proxy and from the performance deviation between the investment and proxy. Each of the investment-level risk calculations would be rolled up to arrive at a portfolio-level risk score. It is not clear yet how the translation of “public tools” and “public concepts,” such as tracking error and value at risk, will translate into the unlisted sphere, as discussed earlier. Yet, despite potential implementation issues, from a pragmatic point of view this approach is one of the few available methods to assess risk in the unlisted space.

Taking this analysis a step further to a more nuanced level, Table 2 illustrates how the CIO, infrastructure team, performance group, and risk group might perceive each of the benchmark families relative to their unique professional needs and roles.

A hodgepodge of benchmarks are used by institutions today, each with different strengths and weaknesses. Many pitfalls are associated with taking the public analysis toolkit and plopping it into the unlisted investment space. We have discussed the fact that there are different practical needs, objectives, and rationales across different groups in an organization with respect to the benchmarking conversation.

Given the many pitfalls, the analysis thus far supports the conclusion that there is no benchmark—or system of multiple benchmarks—that single-handedly wins by offering a simple and elegant answer. Selecting a benchmark comes down to picking an option that is aligned with both the institution’s specific infrastructure investment strategy and the wider asset allocation, risk, and performance-measurement systems. Finally, it is necessary to recognize that what is optimal for the organization may not be optimal for any one group within the organization.

PRINCIPLES OF BENCHMARK IMPLEMENTATION IN THE UNLISTED UNIVERSE

In light of the general shortcoming of available infrastructure benchmarks, we propose an analogy to help members of an organization understand the essence of the infrastructure investment program as well as a set of principles to guide performance measurement in infrastructure and other unlisted asset classes. These set the groundwork for a more concrete benchmarking proposal in the next section.
<table>
<thead>
<tr>
<th>Benchmark Family</th>
<th>Strengths</th>
<th>Weaknesses</th>
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</thead>
<tbody>
<tr>
<td>Absolute Return</td>
<td>PG—Unambiguous and easy to implement.</td>
<td>PG—Overall value is subjectively determined.</td>
</tr>
<tr>
<td></td>
<td>IT—Sets a stable performance assessment target and makes it easy to assess attractiveness of investment opportunities.</td>
<td>RG—No relation to risk present in the portfolio.</td>
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<tr>
<td></td>
<td></td>
<td>CIO—Cannot be used to measure the opportunity cost of not investing in public markets.</td>
</tr>
<tr>
<td>Inflation + Margin</td>
<td>PG—Unambiguous and easy to implement.</td>
<td>PG—Margin value is subjectively determined.</td>
</tr>
<tr>
<td></td>
<td>IT—Sets a stable performance assessment target and makes it easy to assess attractiveness of investment opportunities.</td>
<td>RG—No relation to risk present in the portfolio.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CIO—Cannot be used to measure the opportunity cost of not investing in public markets and is not investable.</td>
</tr>
<tr>
<td>Fixed Income + Margin</td>
<td>CIO—Captures the opportunity cost of not investing in a fixed-income portfolio.</td>
<td>PG—Margin is subjectively determined.</td>
</tr>
<tr>
<td></td>
<td>IT—Sets a relatively stable performance assessment target and makes it easy to assess attractiveness of investment opportunities.</td>
<td>RG—No relation to risk present in the portfolio.</td>
</tr>
<tr>
<td>Equity Return + Margin</td>
<td>CIO—Captures the opportunity cost of not investing in a fixed-income portfolio.</td>
<td>PG—Margin is subjectively determined.</td>
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<td></td>
<td></td>
<td>RG—Little relation to risk present in the portfolio.</td>
</tr>
<tr>
<td>Hybrid Return (e.g., 50% MSCI World/50% DEX RRB)</td>
<td>CIO—Captures the opportunity cost of not investing in a combined public debt and equity portfolio.</td>
<td>PG and IT—Does not capture unlisted assets; therefore, it cannot be used to measure the value-add contribution of private investment managers.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RG—Little relation to risk present in the portfolio.</td>
</tr>
<tr>
<td>Custom Portfolio Benchmark</td>
<td>IT—Captures some of the securities that the IT has available within the private opportunity set.</td>
<td>PG and IT—Does not capture unlisted assets; therefore, it cannot be used to measure the value-add contribution of private investment managers.</td>
</tr>
<tr>
<td></td>
<td>RG—A well-constructed portfolio benchmark (or a whole set of tiny customized baskets mirroring each asset) is perhaps the best mirror of risk contained within the portfolio.</td>
<td>RR—Little relation to risk present in the portfolio.</td>
</tr>
<tr>
<td>Peer Group</td>
<td>PG and IT—Can capture the unlisted universe and opportunity set; therefore, it can be used to measure the value-add contribution of private investment managers.</td>
<td>CIO—Cannot be used to measure the opportunity cost of not investing in public markets and is not investable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PG—Obtaining the data is difficult.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT—Peer group data may originate from inconsistent valuation methodologies, and the return numbers may be skewed upward by survivorship bias.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>RG—No relation to risk present in the portfolio.</td>
</tr>
<tr>
<td>Liability Based</td>
<td>CIO—Aligns investment decisions with long-term obligations and matches cash realizations from investments with distributions to pensioners.</td>
<td>CIO—Cannot be used to measure the opportunity cost of not investing in public markets and is not investable.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IT—Benchmark does not create a useful tool for assessing manager value-add.</td>
</tr>
</tbody>
</table>

**Legend:**
- **CIO** = Chief investment officer.
- **PG** = Performance group.
- **RG** = Risk group.
- **IT** = Infrastructure team.
**A Farming Analogy.** Analogies can make complex problems more tractable. Perhaps a good way to think about measuring performance of the infrastructure portfolio is with the aid of a farming analogy:

When a farmer plants his fields with wheat, potatoes, and Christmas trees, he doesn’t know what the market price will be at harvest; commodity prices tend to bounce around quite a bit during the growing season. A lot of money gets ploughed into the ground when the field is first planted. Over the course of many months (or years, in the case of Christmas trees), green shoots sprout up and seedlings grow stronger. The farmer doesn’t commit a lot of time and money to measuring with a ruler the heights of new shoots and seedlings but instead directs his efforts towards more productive activities: fertilizing, watering, and weeding. Occasionally, there will be a hail storm or a bug infestation and crops will be damaged. When a negative event occurs, at that point the farmer will likely assess the financial implications and recalculate the values of his crops. But generally, if crops are growing according to plan, there is no need to revalue on a quarterly or more frequent basis. Trying to track the value of the crops based on daily commodity movements would be a greater degree of precision than warranted.

Investing in illiquid infrastructure assets with a buy-and-hold strategy over long time horizons is a lot like managing a multicrop farm. Once capital has been committed, it is difficult to redeploy. Returns cannot be known precisely until after the harvest, when the actual performance is tallied.

**General Principles.** The following are eight general principles for selecting and implementing benchmarks for unlisted assets.

1. **Separate the “opportunity cost” and “manager value-add” problems.** There are two very distinct problems when selecting and implementing a benchmark. The first is the CIO’s initial asset allocation problem—how to assess the opportunity cost of whether unlisted infrastructure investments are attractive relative to other opportunities to deploy capital. The second is the ongoing manager value-add problem—how to determine whether or not the investment team’s performance is beating the performance of other investment teams who are also in the same asset market at the same point in time. Both of these questions are critical and lead in the direction of a two-tiered benchmarking system. The first problem calls for an investable equity or bond or a custom portfolio benchmark. The second problem calls for either a peer group or, in its absence, perhaps a custom portfolio benchmark. It may not always be possible to use one benchmark to achieve both purposes. The benchmark for the CIO’s purposes must be investable so that if attractive infrastructure opportunities are limited in supply in a given year, then the capital can be allocated to the listed benchmark alternative.

2. **Take the long view.** A long-term investment strategy requires a long-term approach to benchmarking and performance evaluation. This principle has a number of ramifications. The first ramification is that the benchmark must have long-term staying power; it must survive as a fair yardstick of opportunity cost and manager value-add for more than 20 years, including times of high inflation, stock market bubbles, and severe recessions. Staying power is less certain for custom portfolio benchmarks than for broad-based indices because of inevitable changes in components and politics surrounding periodic rebalancing. Changing a benchmark can create all kinds of political problems within the organization, including potentially complex issues of retroactive compensation, and it can be demoralizing and frustrating for the investment team, who has spent several years building up a portfolio to perform well against a given benchmark only to have to move the original goalposts. The second ramification is that the benchmark should be relatively stable and reflect long-term averages. If it is highly volatile in the short and medium run (e.g., the equity markets are volatile on a daily basis), the infrastructure portfolio looks like it is gaining and losing value relative to the benchmark when in reality, the portfolio value hasn’t changed in value at all. The third ramification is that the investment team should not be penalized for taking long-term positions (i.e., plowing money into the ground, recalling our farming analogy, and not recovering it for a few years, if this indeed is part of the intended strategy). What is important from a performance monitoring standpoint is to analyze cash flows associated with each investment relative to cash-generation forecasts, a topic that we discuss in more detail later.
3. *Create the right incentives.* The interplay between benchmark choice, the institution’s policy for valuing assets on the book, and the institution’s policy for awarding performance compensation creates a set of incentives that influences the decisions and behavior of the investment team, who select, manage, and exit investments. For example, if a valuation system is implemented that holds assets at cost and does not recognize capital appreciation until sale, then the investment team will be incentivized to “clip coupons” (i.e., to buy assets that return entirely in the form of dividend yield) or, from time to time, to sell down the choicest assets in the portfolio that have generated the greatest total return in order to recognize the gain. Neither of these outcomes would be desirable. On the contrary, if a valuation system permits aggressive revaluation of assets on the book based on mark-to-model assumptions, then the investment team will be more likely to hunt down assets with aggressive growth and operational assumptions and higher levels of uncertainty in revenue and EBITDA forecasts. In order to create a more balanced incentive, it would be necessary to incrementally recognize economic value-add for the purpose of awarding performance compensation—but on a conservative basis, to avoid overcompensating the manager before the harvest is in. Ultimately, the incentive system must reinforce the long-term investment strategy and must recognize long-term performance with long-term compensation.

5. *Match benchmark and valuation frequency.* With a portfolio of illiquid assets, investors are well advised not to publish new performance results relative to the benchmark more frequently than new valuation points are actually available for the assets. Publishing daily or even weekly updates to the benchmark creates a lot of meaningless noise that is potentially distracting and confusing. Most infrastructure funds and companies provide third-party audited financial statements once every year. Some provide statements quarterly or on a six-month basis, but the common denominator is once annually. Any attempt to benchmark the portfolio more frequently is not a good investment of time and effort, especially if the benchmark consists of an equity market component with a lot of short-term market volatility. We call this idea the “principle of frequency matching” or “the principle of valuation point matching.”

6. *Contemplate cost–benefit trade-offs.* In establishing a system of benchmarks and valuation protocols for unlisted assets, it is possible to create a process that is highly time and resource intensive, with more frequent points of measurement, or alternatively, one that is less burdensome and more straightforward. The general rule of thumb when considering various options is to assess the marginal benefit of adding additional features and complexity. For example, based on our first principle, it can sometimes be desirable to have two separate benchmarks—one for determining opportunity cost when making allocation decisions and the other for assessing manager value-add. Of course, going to a two-layer system increases the cost and complexity of implementation. This principle also builds on the idea that in a portfolio that resembles a farming operation, with deep cash outlays, a long-term hold period, and illiquidity, there is negligible benefit to overmeasuring in the short run. We call this the “principle of operational efficiency.”

7. *Track the business plan.* It is difficult to know how to interpret early performance for a long-term investment, just as the farmer cannot forecast his harvest from the first shoots and seedlings. After cash goes in, it may take several years before cash distributions
accumulate to the point of ensuring success. Rather than spending time measuring shoots and seedlings, it would make more sense to invest time in watering, fertilizing, and weeding. One solution is to put more emphasis on tracking the performance of the investment relative to the initial business plan (i.e., tracking operational targets, performance milestones, and deviations from base-case financial model projections). It would represent a paradigm shift for the industry, but the investment team compensation could conceivably be indexed to the achievement of the initial business plan and cash flow projections, basically tracking the performance-based compensation for senior executives in each of the underlying businesses. The benefit of tracking business developments more closely is that principal direct investors would be better prepared to utilize board seats and voting rights to provide strategic input and hold management to account. We refer to this as the “principle of endogenous benchmarking,” which is a label that communicates the idea of wanting to track the success of an investment against the specific goals and objectives of each business rather than against an exogenous basket of unrelated securities.

8. Revalue conservatively. There are two risks if illiquid asset values are marked up too quickly on the book before performance is unequivocally borne out. The first risk relates to overcompensating managers. The second risk involves positioning the organization for negative press coverage and board scrutiny if write-downs occur as a result of overambitious marks. As such, the revaluation process should err on the side of conservatism, which is a common principle in cost accounting. Mark downs should occur immediately as value is impaired; markups should only occur if multiple years of consistently higher cash flows have been reported. Future research should examine how the infrastructure benchmark can be adjusted with appropriate premiums for leverage risk, country risk, capital expenditure risk, and other factors. ◆

NOTES

1. The few available indicative data sources on the performance of unlisted infrastructure investments over history are as follows: Benjamin Esty, “Returns on Project-Financed Investments: Evol-


2. There is a peer group index offered by the International Property Databank (IPD) that solves this problem for the real estate industry. It pools data from seven or more of the Canadian pension funds that have portfolios larger than $1.5 billion and own relatively comparable-sized assets. Each of the institutions pays a base fee of approximately $20,000 and an additional fee for data customization.

3. In private equity, it is not uncommon to have a “clawback mechanism” to provide recourse in the event that the general partner is compensated in the short term for what ultimately turns out to be lousy performance in the long term.

BIBLIOGRAPHY


Jagdeep Singh Bachher is deputy chief investment officer at Alberta Investment Management Corporation.

Ryan J. Orr is executive director at Stanford University’s Collaboratory for Research on Global Projects. Daniel Settel is co-founder and vice president of operations at Zanjato Group, LLC.