Wafra

Emerging Trends in Pension Management

The Case for In-House Capabilities

October 7, 2019

Prepared For:

Investments and Pensions Oversight Committee
New Mexico

About Wafra

Wafra is an investment firm primarily focused on alternative strategies and established to build long-term prosperity for asset owners around the world.

Who We Are

165
Investment Professionals

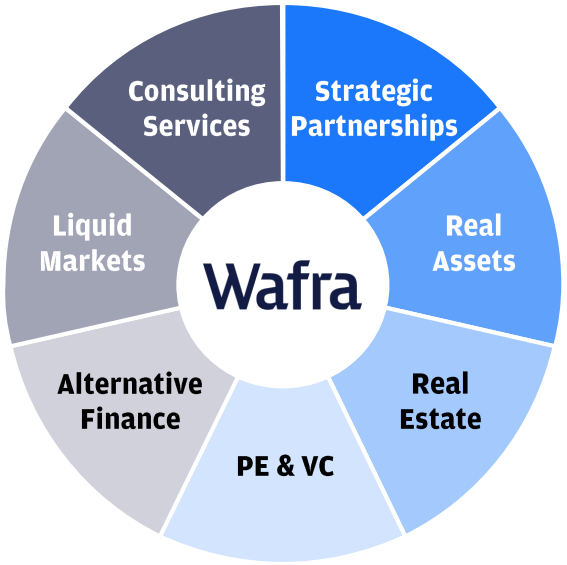
$23.9 billion
Assets Under Management*

83%
Assets in Alternative Strategies

- Wafra was founded in 1985 and is an SEC-registered investment adviser, beneficially owned by the Public Institution for Social Security of Kuwait.
- Wafra, together with its affiliates, have discretionary and non-discretionary assets under management (including undrawn capital commitments) of approximately $23.9 billion, as of 31 March 2019.
- Behind our investment strategies are talented professionals, principally in New York, Texas, and other financial centers, who bring expertise and experience to deliver strategic, reward-focused solutions.

What we Do

Wafra seeks strong, risk-adjusted returns for its partners and clients across six alternative investment strategies and through its consulting services and affiliates.



*Includes affiliates

Please see the Notes and Disclosures on page 46 which form an integral part of this presentation.

Team Introduction

Richard Safranek
Senior Managing Director
Head of Advisory and Research

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Vice President

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Today's Discussion

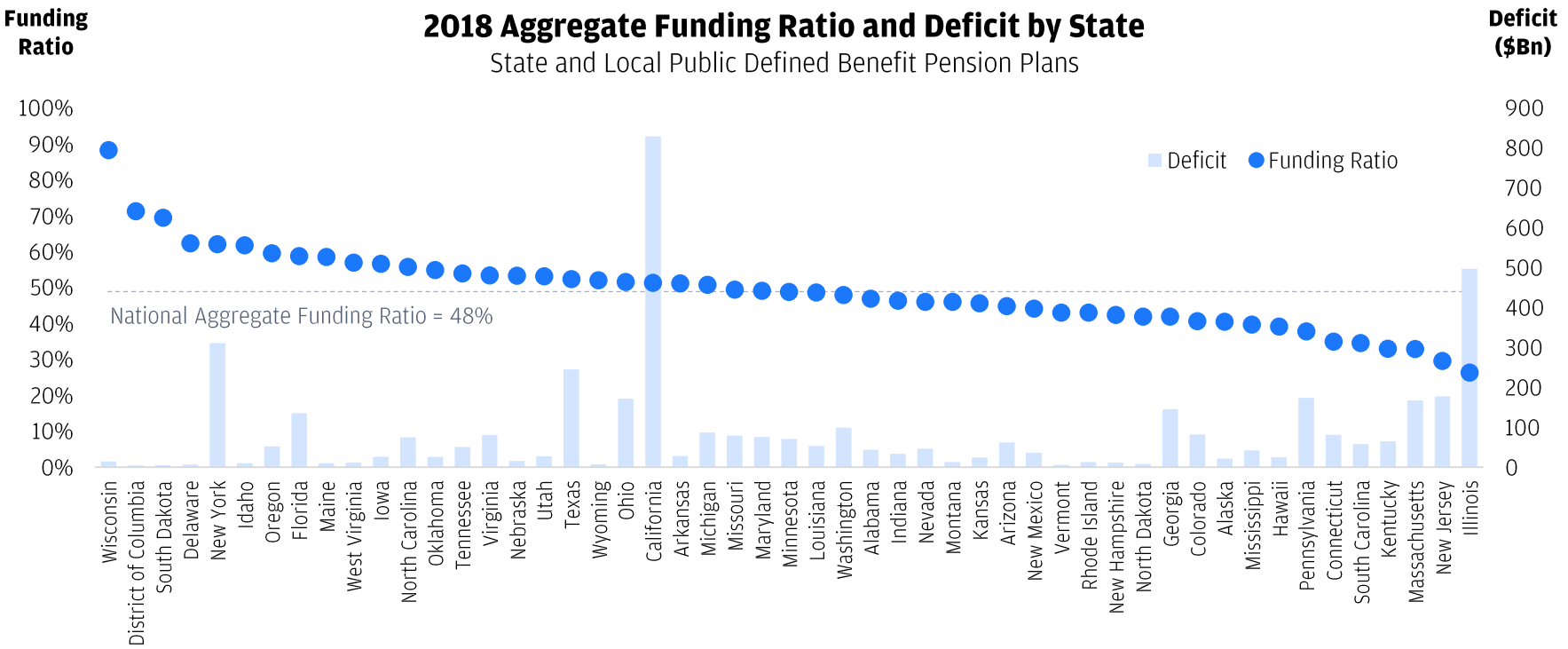
Wafra

I. The State of Public Defined Benefit Pensions

Wafra

Deficits are a National Challenge

Aggregate deficits for state and local defined benefit ("DB") pension plans reached $4.4T in 2018; the national aggregate funding ratio was just 48%.



Note: As of September 2018, the Bureau of Economic Analysis uses a projected benefit obligation (PBO) basis to estimate state and local government pension liabilities, rather than report on an accumulated benefit obligation (ABO) basis. A projected benefit obligation is an actuarial measurement of what a company will need at the present time to cover future pension liabilities. It is used to determine how much must be paid into a defined benefit pension plan to satisfy all pension entitlements that have been earned by employees up to that date, adjusted for expected future salary increase. Accumulated benefit obligation is an approximate amount of a company's pension plan liability at a single point in time. ABO is estimated based on the assumption that the pension plan is to be terminated immediately; it does not consider any future salary increases. This differs from the projected benefit obligation, which assumes that the pension plan is ongoing, and thus accounts for future salary increases.

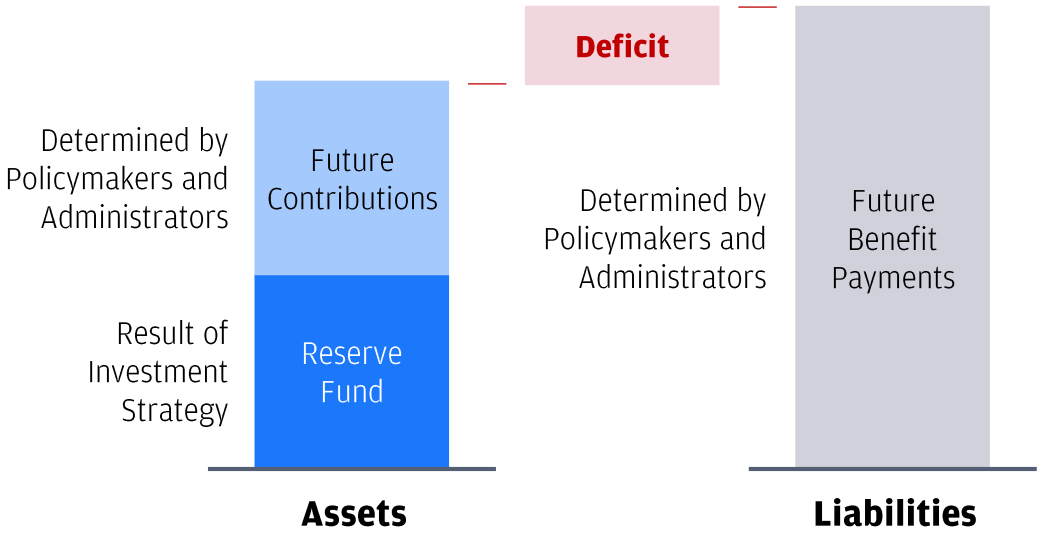
Sources: Bureau of Economic Analysis, "Supplemental Estimates of State and Local Government Defined Benefit Pension Plans"; US Census Bureau "Annual Survey of Public Pensions" 2018; Wafra analysis

Please see the Notes and Disclosures on page 46 which form an integral part of this presentation.

Multiple Factors Contribute to Plan Deficits

DB schemes are sensitive to demographic and economic changes, meaning benefits may accrue faster and longer than anticipated and asset growth may not keep pace.

Simplified Pension Fund Balance Sheet
Illustrative



Potential Deficit Drivers
Non-Exhaustive

- Pension fund assets have not generated expected investment returns.
- Contribution rate is insufficient to support earned benefits.
- Beneficiaries are accruing more benefits than expected and / or longer than anticipated.

Sources: Wafra analysis

Please see the Notes and Disclosures on page 46 which form an integral part of this presentation.

OTPP Demographic and Economic Pressure

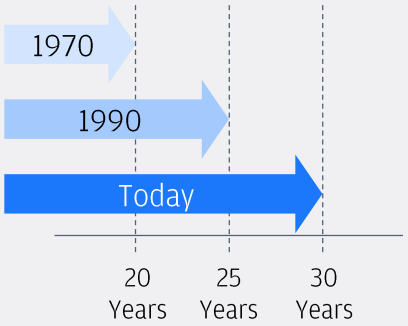
For example, the Ontario Teachers' Pension Plan (OTPP) faces funding challenges due to longer retirements, low interest rates, less cash, and low risk tolerance.

The Ontario Teachers' Pension Challenge

Longer Retirements

Paying lifetime pensions is more expensive when members live longer.

Expected Years on Pension



Low Interest Rates

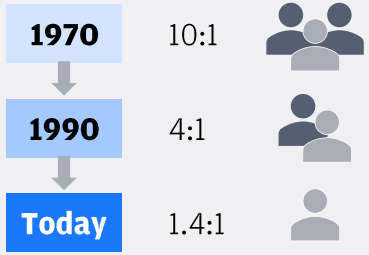
When interest rates are low, the pension plan needs to set aside more money to fund future pensions. Interest rates have dropped to historical lows in recent years.

Cost to Fund a CAD $49,100 Pension by Interest Rate

Low Investment Risk Tolerance

The pension plan cannot afford to take as much investment risk because there is a smaller proportion of contributing members to make up any potential loss.

Ratio of Working-to-Retired Members

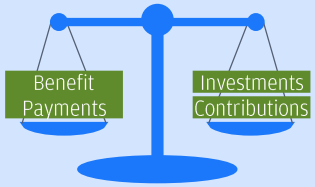


See Following Page

Less Cash to Invest for Future

Every year, the pension plan pays more in benefits than it receives in contributions. Investment income usually makes up the difference, but this reduces assets available to invest for the future.

Balancing Income and Liability



Sources: OTPP, "The Pension Challenge" 2019

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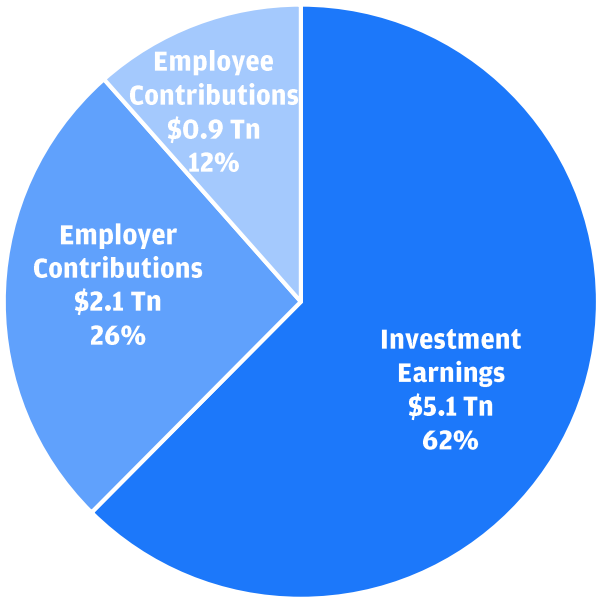
Sensitivity to Rate of Return

Because investment earnings account for a majority of revenue for a typical public pension fund, the return assumption has a major effect on a plan's funding level.

Sources of Revenue 1988 – 2018

Aggregate State and Local Defined Benefit Public Pension Plans



Impact of Actuarial Target Rate of Return

- An investment return assumption that is set too low will overstate liabilities and costs, causing current taxpayers to be overcharged and future taxpayers to be undercharged.
- A rate set too high will understate liabilities, undercharging current taxpayers, at the expense of future taxpayers.
- An assumption that is significantly wrong in either direction will cause a misallocation of resources and unfairly distribute costs among generations of taxpayers.

Sources: NASRA, "Public Pension Plan Investment Return Assumptions" February 2019; US Census Bureau "Annual Survey of Public Pensions" 2018; Wafra analysis

Please see the Notes and Disclosures on page 46 which form an integral part of this presentation.

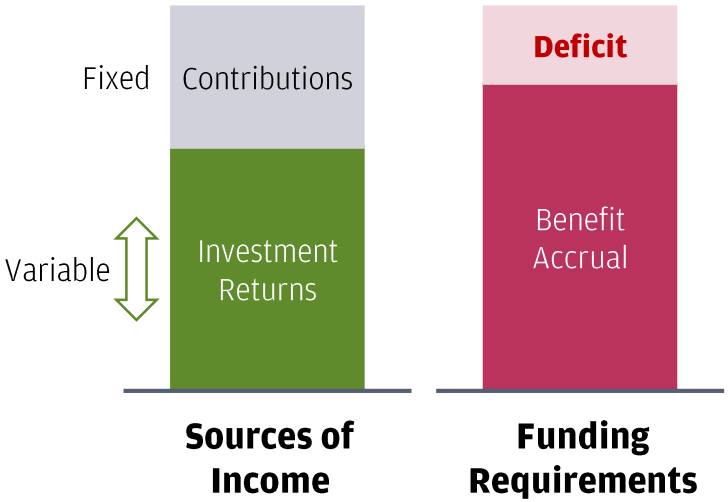
Performance is Essential to Closing Deficits

To maintain the pension promise, many pensions across the country are targeting a 7.24% p.a. rate of return (on average) to cover Benefit Accrual and reduce Deficits.

Investment Challenges
Non-Exhaustive

- 7.24% rate of return cannot be met by traditional asset classes alone.
- Alternative asset classes target higher return, but with a higher risk profile.
- Investors typically encounter capacity constraints in alternative asset classes.
- Liquidity can be a concern when investing in alternative asset classes.
- The incentives for asset managers are not always aligned to those of asset owners.

Simplified Sources and Uses of Annual Income
Illustrative



Sources: NASRA, "Public Pension Plan Investment Return Assumptions" February 2019; Wafra analysis

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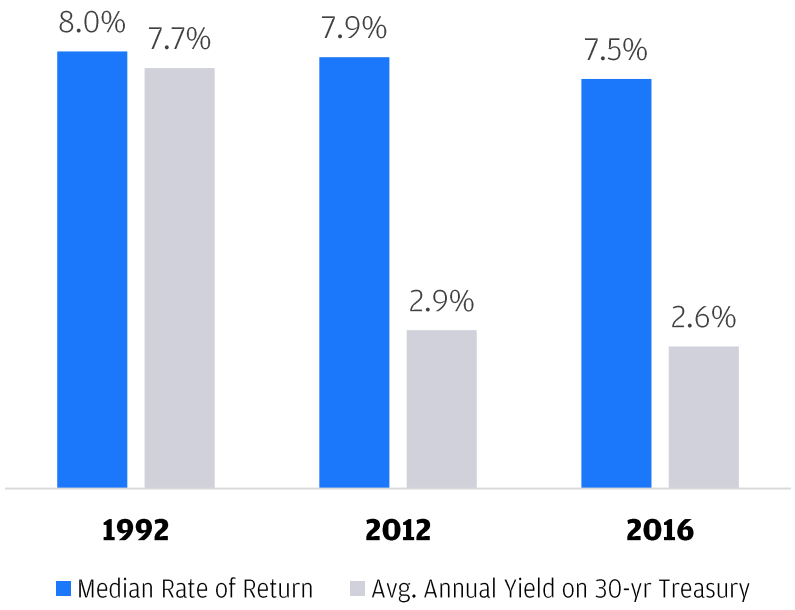
Searching for Return

Pensions can no longer rely on fixed income and other traditional asset classes to deliver the returns necessary to meet their obligations.

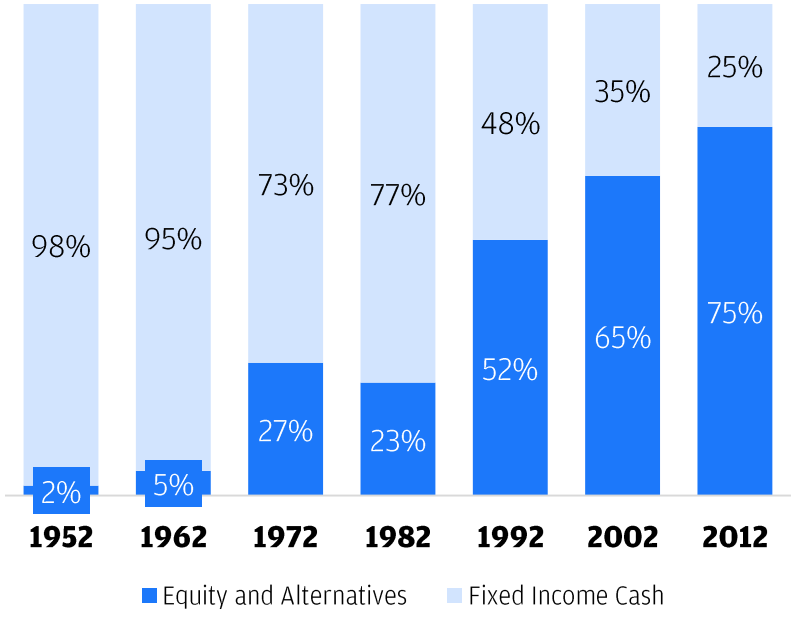
Reliance on Risk Premium for Returns

Treasury Yields vs US Pension Target Rate of Return



Shift in Strategic Asset Allocation

US Public Pension Asset Allocation



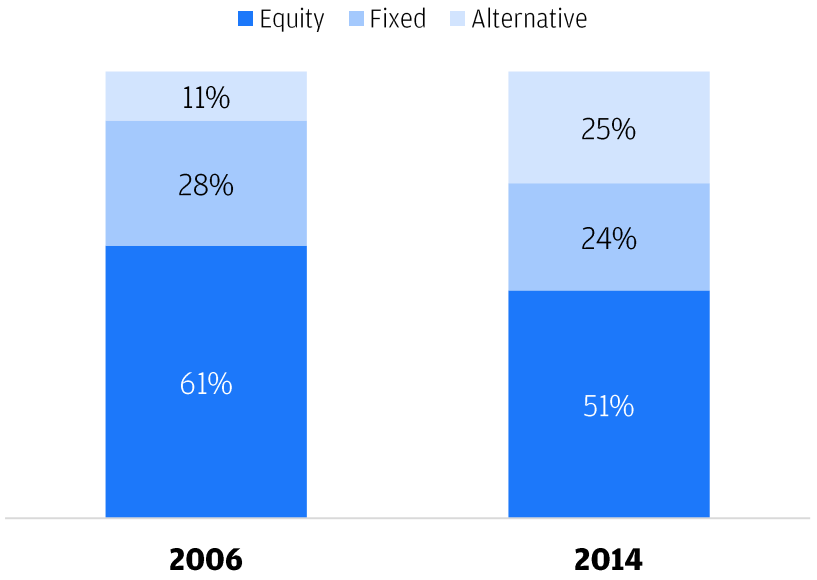
Sources: Pew Trusts, "State Public Pension Investments Shift Over Past 30 Years" June 2014; Pension & Investments "Low Return Assumption Trend Continues" July 31st, 2018

Please see the Notes and Disclosures on page 46 which form an integral part of this presentation.

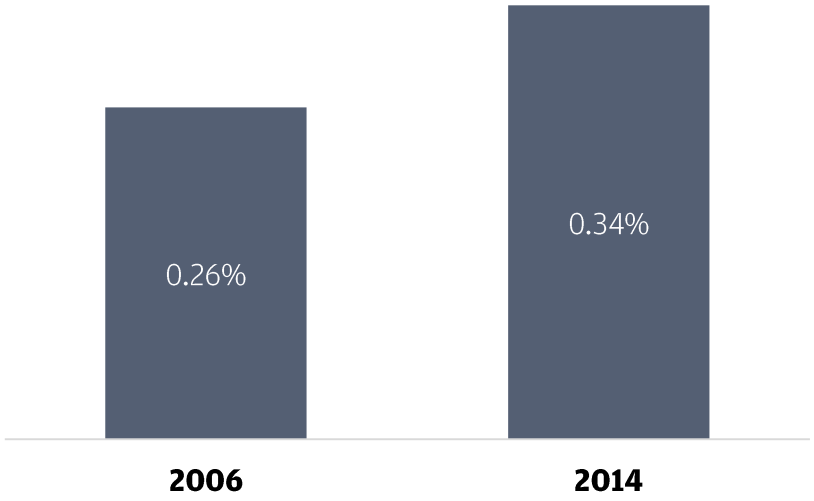
Growth in External Management Fees

But shifting portfolios to higher earning alternative asset classes means asset owners are paying more to achieve their target returns.

Public Pension Alternative Asset Class Allocation
2006 vs 2014



Public Pension Average External Management Fee
% of Assets; 2006 vs 2014



Sources: Pew Trusts, "State Public Pension Funds Increase Use of Complex Investments" April 12, 2017

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II. Improving Net Performance Through Management Insourcing

Wafra

Section Summary

- **Diversification into alternative asset classes can provide attractive returns** relative to traditional liquid portfolios, **but this comes with higher fees** to third-party managers.
  - Pensions are developing **new approaches to control fees and capture return**; for **large, established pensions, insourcing investment teams** is an attractive solution.
- **Determining which assets to insource requires an institution-specific evaluation** of strategies, fee savings and ease of implementation
- Whereas the decision to insource public market portfolios is binary, there are **several innovative approaches to insourcing alternative portfolio** including coinvesting, joint ventures or club investing, and direct investing.

In This Section

Insourcing

To address fee pressure and improve net performance, asset owners are turning to insourcing – managing investment portfolios with in-house investment teams.

Realized Cost Savings from Insourcing
Selected Experiences

SWIB State of Wisconsin Investment Board	State of Michigan Department of Treasury	ERS Employees Retirement System of Texas	MERS Municipal Employees' Retirement System
Manages the $90 Bn Wisconsin Retirement System **saved $63 Mn in external fees** in 2015 and has gradually increased the proportion of insourced assets to 59% of total assets in 2015 from 51% in 2011.	Manages the $50 Bn Michigan Retirement Systems **saves a net $20 Mn to $30 Mn per year** through managing 35% of the total portfolio internally.	**Pays fewer than 10 basis points for investment management** and administration of the $25 Bn pension fund, with the cost of internally managed assets four times less than external manager fees; about 60% of assets are managed internally.	**Runs its entire investment division at a cost of 1.5 basis points per year**, including the 20% of assets that are managed internally; external manager costs averaged 35 basis points in 2014.

Sources: Pensions & Investments, "Low Returns, Fee Scrutiny Drive Rise of Pension Insourcing" June 13th, 2016

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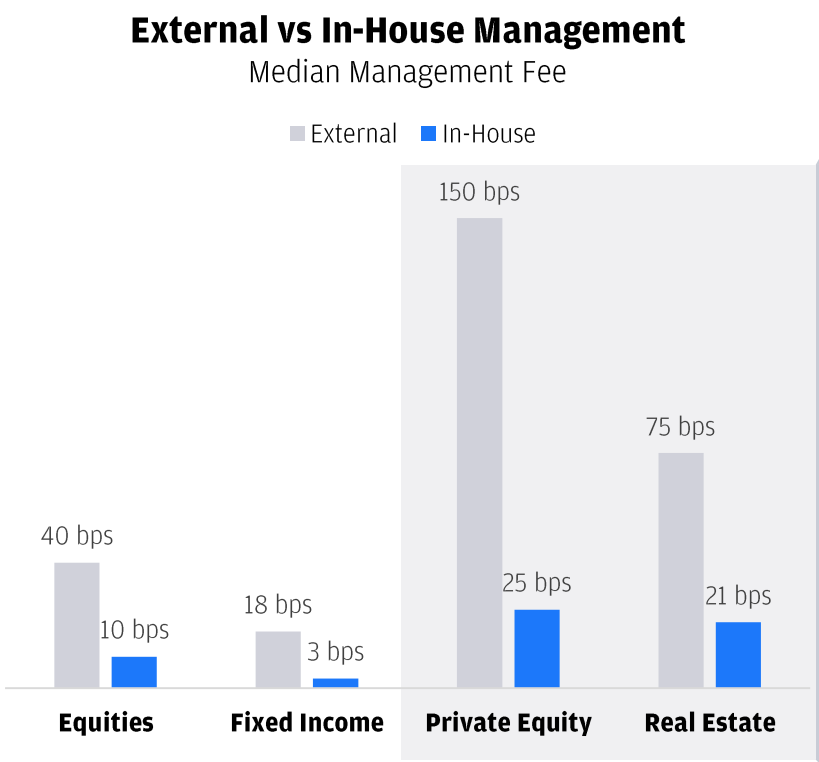
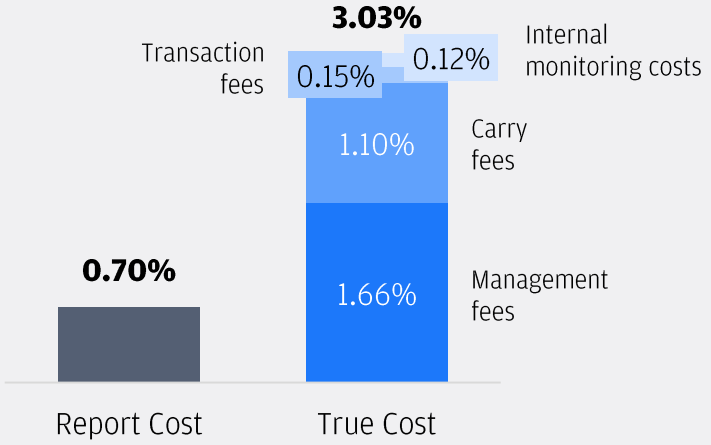
Potential Fee Savings

The potential for fee savings is most notable in the alternatives space, where all in-fees can be particularly onerous.



Estimating True Management Expense

- Studies suggest that costs are typically underreported in the financial statements of many funds due to the accounting treatment of some expenses.
- Whereas Private Equity Limited Partners typically report 70 bps in fees on Net Asset Value (NAV), the true cost may be as high as 300 bps on NAV.



Note: Illiquid asset costs are not typically marketed on as a percentage of net asset value, but on the committed amount during the investment phase

Sources: CEM Benchmarking, "CEM Study Reveals In- House Savings" April 20, 2012; CEM Benchmarking "How Implementation Style and Costs Affect Private Equity" Spring 2014

Please see the Notes and Disclosures on page 46 which form an integral part of this presentation.

OTPP: A Leader in Investment Innovation

OTPP is a leading pension that manages CAD $191.1 Bn in net assets and serves 327K members; since 1990, 78% of the plan's funding has come from investment income.

ONTARIO TEACHERS' PENSION PLAN

- Established in 1990 for working and retired teachers
- Largest single-profession scheme and third largest scheme in Canada
- International reputation for innovation and leadership in investment management, employing 1,200 professionals in Toronto, London and Hong Kong and 1,500 at their real estate subsidiary, Cadillac Fairview

Plan Snapshot

327,000
Members at Dec. 31, 2018

CAD $191.1 Bn
Net assets at Dec. 31, 2018

CAD $6.1 Bn
Annual pension and benefits payroll in 2018

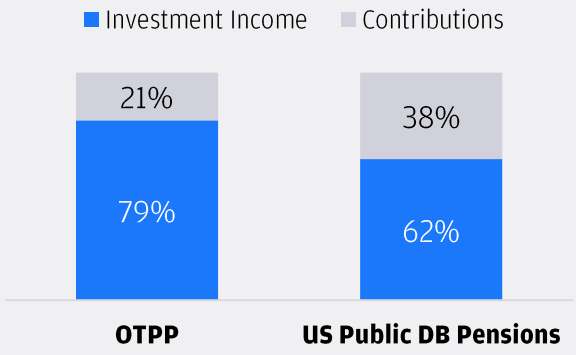
Investment Performance

9.7%
Annualized net rate of return since 1990

2.0%
Annualized net rate of return above benchmark since 1990

CAD $10.0 Bn
Surplus at Dec. 31, 2018

Aggregate Sources of Funding
1990 - 2018



Sources: OTPP, Annual Report (2018)

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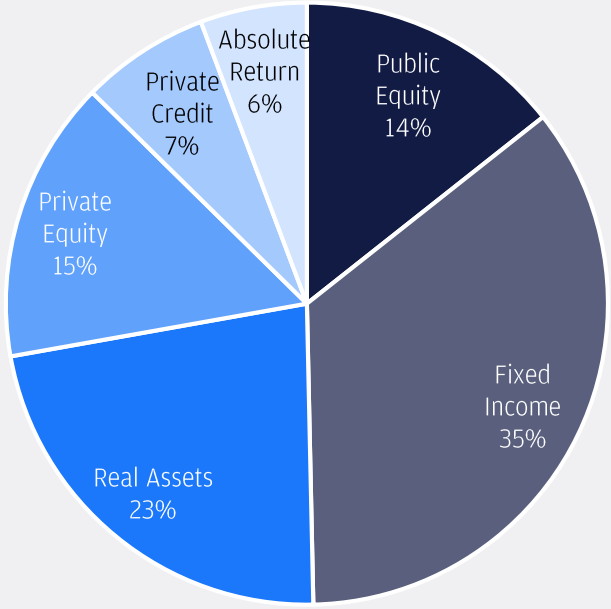
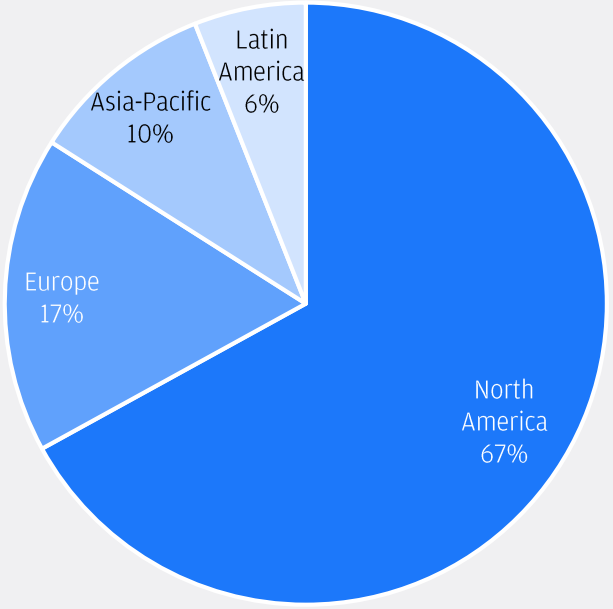
Global Alternatives Portfolio

Much of OTPP's success is attributed to its global, alternatives-centric portfolio that is primarily managed by in-house resources in Toronto, London, and Hong Kong.

2018 Asset Allocation



2018 Geographic Exposure



80% assets

80% of assets are managed with in-house resources who support allocations in Private Equity / Venture Capital, Real Assets, Absolute Return and Opportunistic Credit.

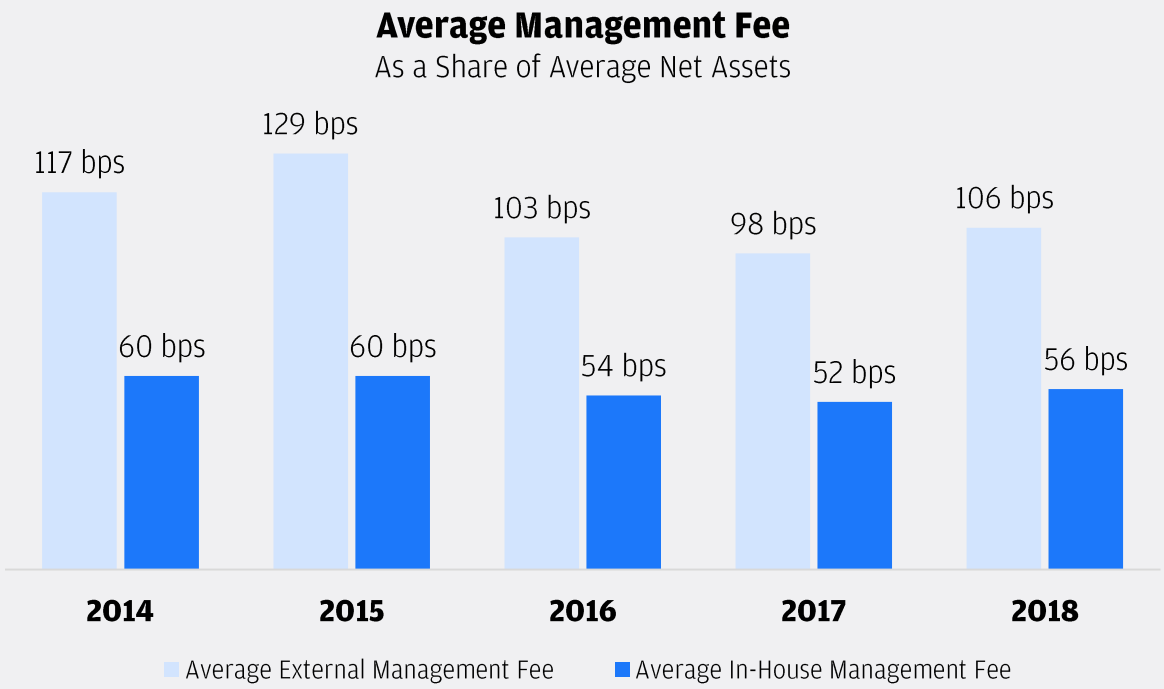
50+ countries

OTPP holds investments in 50+ countries with 300+ global investment partners managed from **three investment offices in Toronto, London and Hong Kong**.

Sources: OTPP, Annual Report (2018)

Scalable In-House Management

Despite the associated investment team and infrastructure costs, OTPP is able to manage internal portfolios at almost half the cost of their external portfolios.



- OTPP believes managing assets in-house, combined with its strategic partnership model with external managers, is a cost-effective means to implement its strategies.
- However, this requires the plan to compensate an internal investment team and related supporting function such as legal, operations and finance as well as maintain its offices around the world as part of its commitment to identify and participate in investment opportunities globally.
- The plan's substantial investments in private assets and commitment to active management result in higher costs than if assets were deployed in lower-cost public securities and passive mandates.

Note: Assumes 80% of assets are managed in-house (per public statement by the Plan), in-house management fees include all Administrative expenses and Transaction expenses, External Management Fees are as reported by the plan.
Sources: OTPP, Annual Report (2014 – 2018); Wafra analysis

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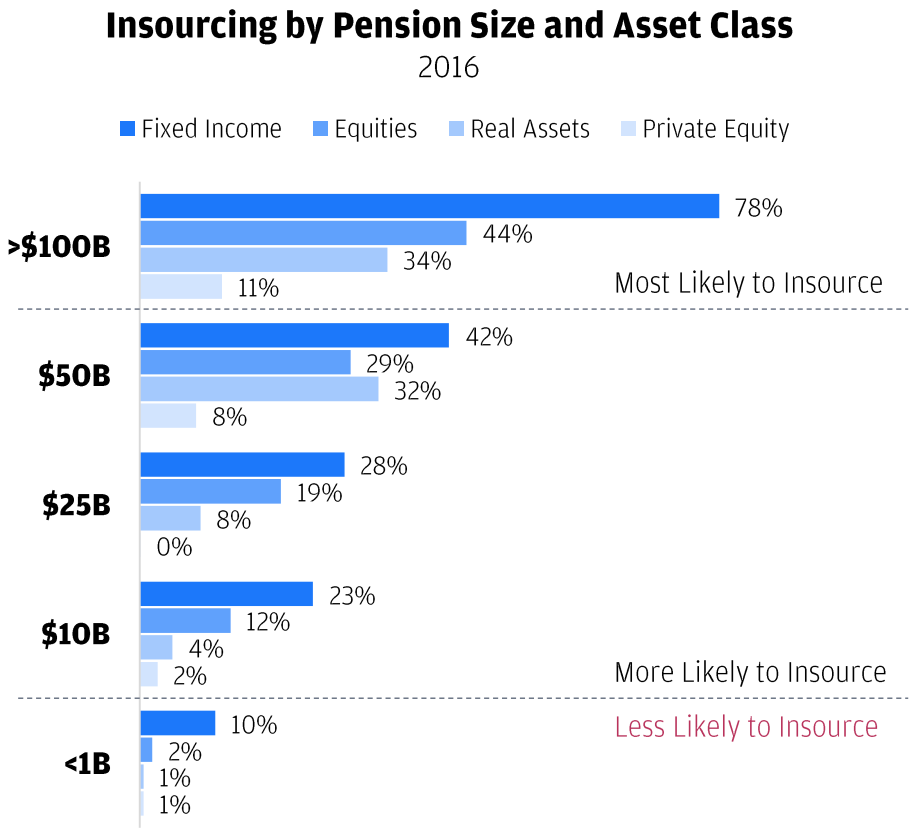
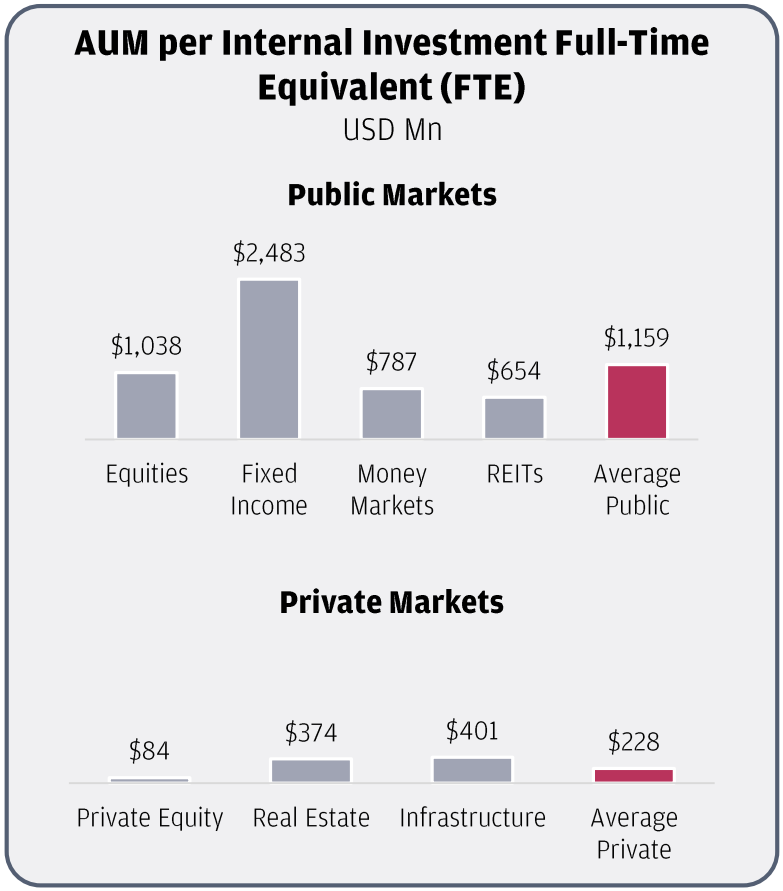
Typical Insourcing Profile

Insourcing is not right for everyone, those that pursue insourcing typically manage more than $10 Bn in assets for economies of scale to generate cost savings.





Sources: McKinsey, "The Limits of Pension Consolidation" September 2018; CEM Benchmarking, "How Large Pensions Organize Themselves" Spring 2012

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Which Assets to Insource?

Where insourcing is appropriate for asset owners, the decision around what assets to insource should balance potential cost savings and ease of implementation.

Asset Class	Potential Cost Savings		Ease of Implementation Discussion	
Traditional Equities	◔	Competitive fee pressures have compressed the cost to manage passive equities portfolios to historic lows.	◕	Passive equity strategies which track indexes are simpler to manage and typically are the first insourced.
Traditional Fixed Income	◔	The scale offered by leading fixed income managers often gives those managers economies of scale to offer attractive pricing.	◕	Whereas fixed income instruments like treasuries are simpler to insource because of their high liquidity and stability, high yield credit and other complex fixed income instruments are more difficult to insource.
Real Assets / Real Estate	◕	Several studies show internally-managed, core real estate assets have superior risk-adjusted returns versus riskier externally-managed opportunistic investments.	◑	Whereas "brownfield" investments may simplify the valuation and diligence process, "greenfield" investments are typically more complex to value.
Private Equity & Credit	●	The traditional 2% management fee, 20% carried interest fee structure typical for private strategies can meaningfully impact net investment returns.	○	Insourcing Venture Capital and Private Equity requires significant investment to build deal flow and the asset class requires greater diligence and monitoring.

○ = Low ● = High

Sources: Pensions & Investment, "Low Returns, Fee Scrutiny Drive Rise of Pension Fund Insourcing" June 13, 2016; CEM Benchmarking, "Real Estate Performance by Investment Implementation Style" December 2018; GIC, Annual Report (2018); Wafra analysis

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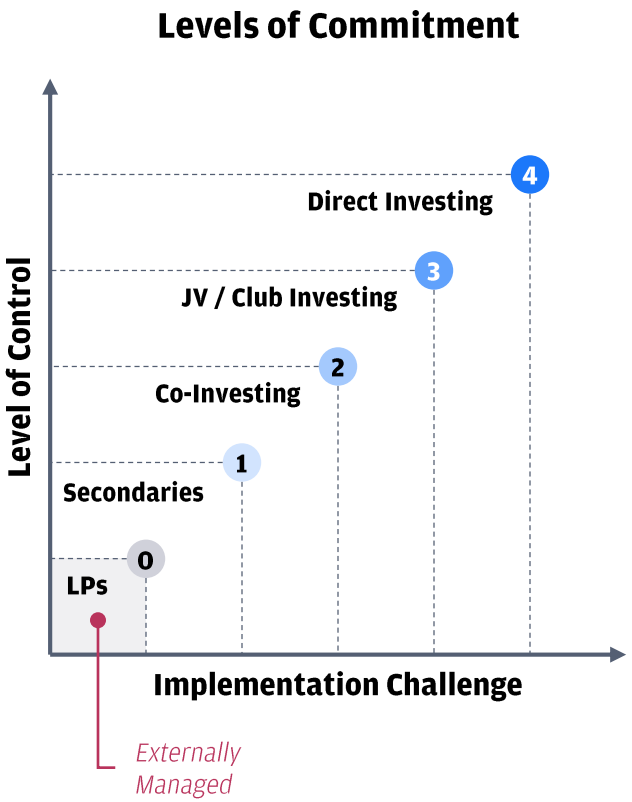
Approaches to Investment

And whereas insourcing public market portfolios is mostly a binary decision, asset owners can leverage a range of insourcing models to manage their private assets.



Public Markets

0 Limited Partner (LP) Commitments
Commitments of capital to a general partner who manages the investment according to the stated investment strategy.

4 Direct Investing
Fully insourced investment activities wherein the institutional investor assumes all investment decision-making.

Private Markets

0 LP Commitments

1 Secondaries
Transfer of LP position(s) from one LP to another.

2 Coinvesting
Opportunities for LPs to invest directly alongside the GP.

3 Joint Venture / Club Investing
Partnership investing between institutional investors or between an institutional investor and an asset manager.

4 Direct Investing

Source: Wafra analysis

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Private Market Capital Deployment

Successful pensions employ different approaches within co-investing, JVs, direct and platform investing to secure lower fees and more control over investments.

Examples of Deployment Approaches

Secondaries

CPP INVESTMENT BOARD

Canada Pension Plan Investment Board (CPPIB) has expanded its secondaries team to 20 professionals with $9.4B in AUM.

Co-Investing

TRS
TEACHER RETIREMENT SYSTEM OF TEXAS

The Teacher Retirement System of Texas (TRS) manages a co-investment program to generate deal flow and develop in-house expertise.

JV / Club Investing

ONTARIO TEACHERS' PENSION PLAN

OTPP and Alphabet launched a joint infrastructure company to acquire infrastructure technology.

Direct Investing

CalPERS California Public Employee Retirement System

CalPERS is evaluating a new direct private equity model to reduce fees and increase investment control by standing up two separate management companies that will allow the fund to offer competitive salaries.

Sources: Private Equity International, "CPPIB The Smartest Nicest Guys..." February 2019; Private Equity International, "Texas TRS to co-underwrite co-investments" July 2019; PE News, "Alphabet Teams Up with OTPP" August 30th, 2019; PE Real Assets, "US Pensions: The new DIY Investors?" May 2017

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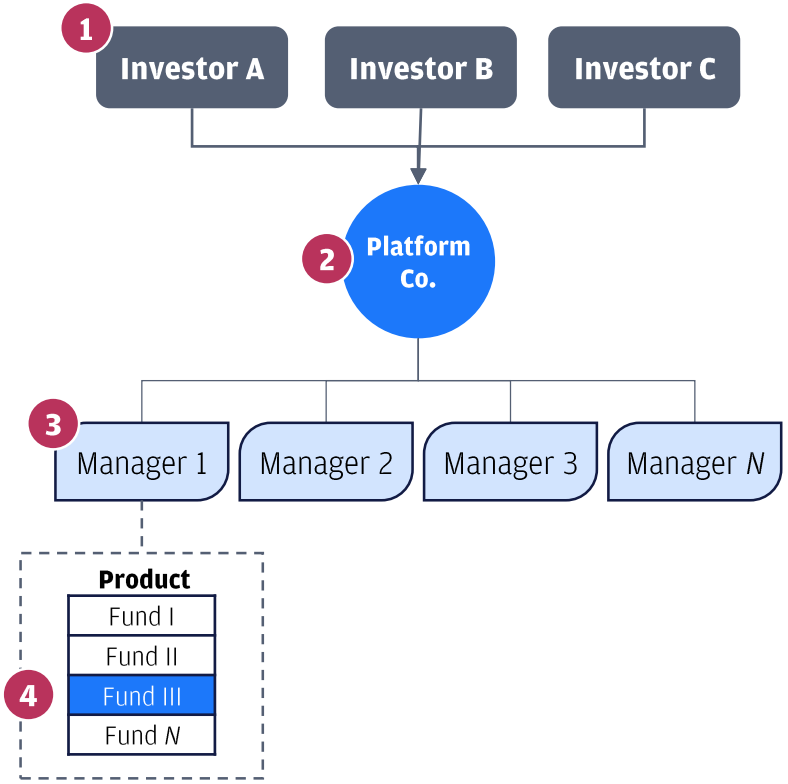
"Virtual" Insourcing

"Virtual" manager insourcing by taking ownership stakes in underlying managers is a special case of Direct Investing that is gaining traction with some asset owners.

Hypothetical Platform Investment Structure

1. **Institutional Investors** — Asset owners fund platform company to invest in specialized asset managers.
2. **Platform Company** — Platform company is professionally-managed by a subadvisor to provide seed capital to asset managers in exchange for economics in their businesses.
3. **Investment Managers** — Managers seeded by the platform company raise third-party capital to launch their investment strategies.
4. **Underlying Portfolios Investment Exposure** — Platform investors have access and exposure to underlying investment in the manager's seeded strategies.



Sources: Wafra analysis

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Enterprise Value Lifecycle

There are multiple points of entry when contemplating acquisition of private stakes in alternative asset managers to build a "virtual" insourcing program.

Focus of following pages

Private Stake Creation

Catalytic capital commitments and strategic value-add allow investors to access manager ownership at or near inception

Astra Capital Management
Lantern
Amulet Capital Partners LP
Motive Partners
Basalt Infrastructure Partners
VGO Capital Partners LLP

Focus of Constellation Strategy

Capital Constellation

Private Stake Purchase

Established fee and carried interest streams are capitalized by the acquisition of a minority equity interest

Siris
Towerbrook
TSG Consumer
OHA Oak Hill Advisors
Stone Point Capital
ArcLight

Focus of Wafra Strategic Investors Strategy

Wafra

Transformative Capital Event

Once managers reach a certain scale, transformational capital events such as majority sales and public offerings become possible

KKR
Blackstone
Ares
Oaktree
Och-Ziff
Apollo
The Carlyle Group

Note: Examples include investments made by Wafra and other market participants

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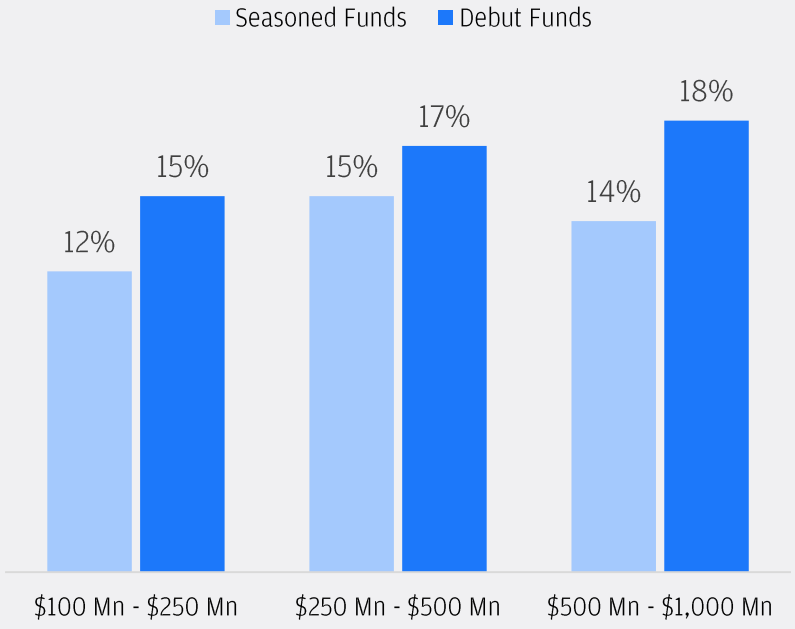
Debut Fund Thesis

Debut private equity funds under $1.0 Bn outperform seasoned funds, but they capture a meager and decreasing share of fundraising capital.

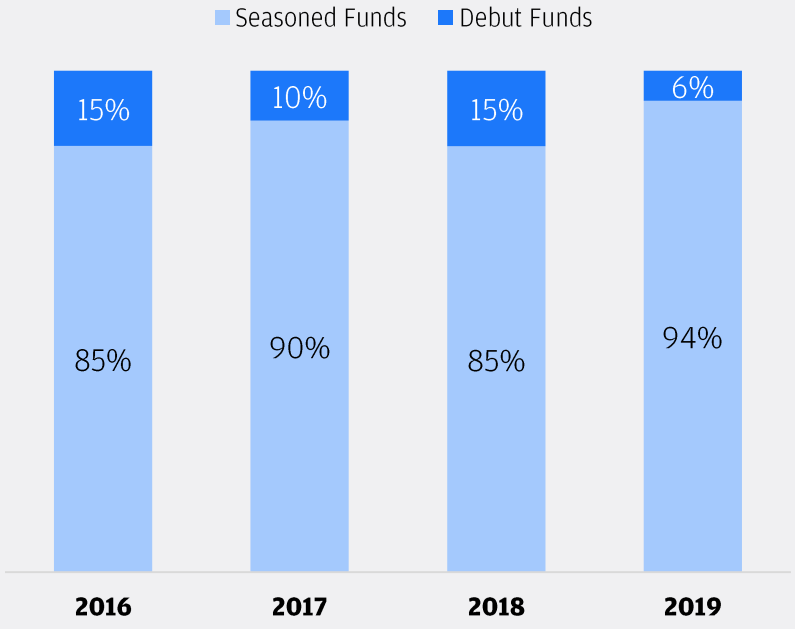
Fund Net IRR

By Fund Size, By Fund Cohort, 1998 - 2017



Private Equity Fundraising Share

By Fund Cohort, By Vintage Year, 2016 - 2019



Sources: MIT / Wafra 2019 Finance Research Practicum, February 2019. Available upon request; Preqin Global Private Equity Fund Database, Wafra analysis, August 2019; Preqin, "Global Private Equity & Venture Capital Report" 2019

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Constellation

Constellation brings together a global group of like-minded asset owners who seek to harness the growth from sustained secular trends in private markets.

Constellation Investors[1,2]

- The Public Institution For Social Security
- APFC
- AP3
- Kuwait Investment Authority
- RPMI RAILPEN
- Wafra

Recent Constellation Investments

- MOTIVE PARTNERS
- Astra CAPITAL MANAGEMENT
- Ara Partners

Note: Wafra has made a GP commitment to Constellation to align interests with investors. APFC, PIFSS and Railpen participate in the Constellation investment strategy through a permanent capital operating company.

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III. Key Enablers for Management Insourcing

Wafra

Summary

- US **pensions seeking to insource compete with asset managers** for top investment talent.
  - To attract the right talent, **pensions must institute competitive pay structures and change investment mandates**.
  - Elected officials and pension plan leadership can **leverage compensation structures to align the fiduciary obligations** of the pension with performance.
  - Elements of a best practice investment pay plan include **base salary, annual incentive, and long-term incentive bonus.**
- To insource successfully, **funds must take a gradual approach** to build due diligence and support capabilities over the long term.
- For insourcing to succeed, pensions must also build sufficient infrastructure, consistent with those found in external managers.

In This Section

Key Enablers

Instituting proper Governance, setting competitive compensation, and standing up core infrastructure are key success factors in enabling management insourcing.

Key Enablers to Investment Management Insourcing
Non-exhaustive

Institute Proper Governance

Good governance is critical to bringing investment management in-house and empowering teams with proper authority.

Set Competitive Compensation

Leading pensions build successful in-house teams by attracting top talent with competitive compensation while aligning pay with their funds' interests.

Stand Up Core Infrastructure

Insourcing requires hiring additional back office personnel based on volume of assets managed, type of assets, and investment complexity.

Source: Wafra analysis

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Institute Proper Governance

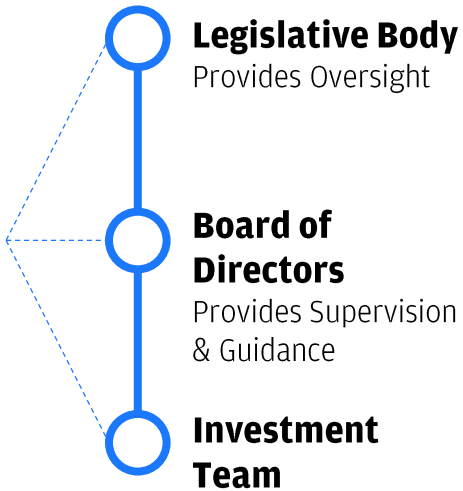
Successful in-house asset management requires instituting many of the policies and processes that external managers have had years to develop.

Key Authorities
Non-Exhaustive

Who will have the authority and responsibility to:

- Allocate assets
- Set expected rate of return
- Set expected contribution rate
- Set budgets
- Set staffing / compensation
- Select investment managers
- Allocate assets for internal vs. external management

Key Stakeholders
Devolution of Power



Legislative Body
Provides Oversight

Board of Directors
Provides Supervision & Guidance

Investment Team
Executes Investment Strategy

Typical Governance Challenges Facing Pensions Contemplating Insourcing

- Who has budgetary control to allow approval for hiring more staff or infrastructure upgrades?
- Is there willingness and ability to pay internal investment officers market-competitive compensation?
- Is there confidence from the board and staff that net returns in an assert class can be improved through internal management?
- Do we have the right operating model / investment structure to support in-house management?
- Can we provide: (1) adequate resourcing: (2) access to data; (3) skilled investment officers; (4) adequate systems infrastructure; (5) and robust administration, including compliance and risk management?

Sources: Funston Advisory Services, "Leading Practices in Investment Governance" 2018 NCPERS CIO Summit; P&I, "Low returns, fee scrutiny drive rise of pension fund insourcing" 2016; P&I, "Good governance crucial to bringing investment management in-house" 2016

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Shared Governance Model

OMERS' governance is split between a technical Administration Corporation with operations mandate and a strategic Sponsors Corporation with oversight mandate.

OMERS Sponsors Corporation ("SC")

Provides strategic oversight and decision-making:

- Determines benefit levels and contribution rates for the Plans, and
- Sets compensation levels and establishes the composition for both the SC and OMERS Administration Corporation Boards

OMERS Administration Corporation ("OAC")

Advises and assists the SC and administers the plan:

- Pays pensions
- Establishes investment policies
- Manages and allocates the assets of the pension plans
- Provides oversight for the actuarial valuations

Sources: OMERS, "Governance – Two Boards with a Joint Strategy" 2019

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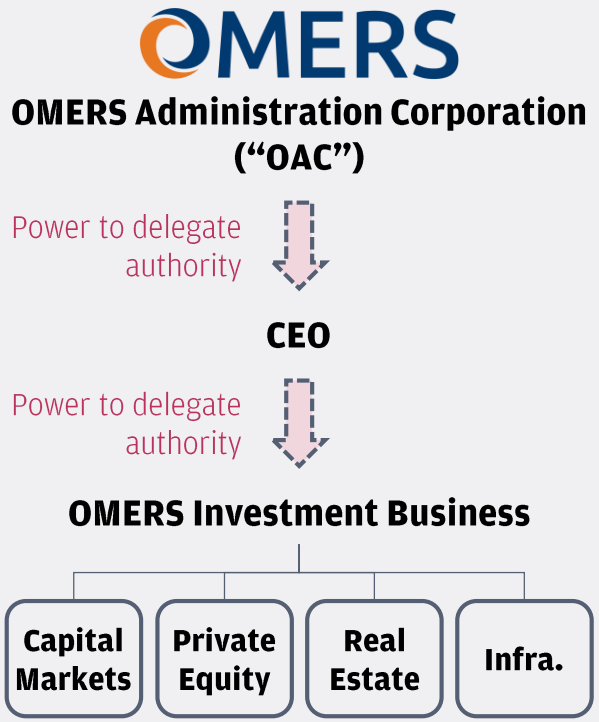
Investment Delegation

The OAC Board – through the Investment Committee – has delegated the authority to make investment decisions to the CEO subject to certain limits.

Delegation of Investment Authority



Investment Authorities Policy

NONEXHAUSTIVE

Authority Limits by Asset Class

	Full Authority	Net Equity Up to CAD $500 Mn
Public Equities	Equity derivatives, commodity derivatives, publicly traded equity/pooled vehicles, closed-end hedge funds	Open-end hedge funds, separately managed accounts or other externally managed vehicles that invest in exchange-traded securities
Short Term Instruments	Cash, cash equivalents, foreign exchange derivatives	N/A
Fixed Income	Public	Private
Private Equity	NONE	Equity or equity-like securities in non-exchange traded entities, private equity pooled vehicles
Real Assets	NONE	Infrastructure, real estate

Sources: OMERS "Statement of Investment Authorities Policy" January 1, 2018.

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Set Competitive Compensation

Leading pensions build successful in-house teams by attracting top talent with competitive compensation while aligning pay with their funds' interests.

Aligning Beneficiary Interests with Investment Talent

Board of Directors

Represent beneficiaries and seek to safeguard the pension promise

- Fulfill the plan's annual obligations and long-term liabilities
- Lower overall plan costs, including investment costs
- Instill investment transparency and accountability

Alignment around Fund Performance

Both the Board and Investment Team should seek to maximize fund performance

Alignment Mechanism = *Incentive pay structure that reflects value creation*

Public funds can craft long-term incentive plans to align their interest and concerns with those of their investment team while still saving on costs versus external managers.

Investment Team

Seek an attractive career value proposition

- Enjoy appropriate investment management discretion
- Receive compensation in-line with skills and experience
- Work on interesting and meaningful projects with meritocratic advancement

Sources: CPPIB, Annual Report 2018; Pensions & Investments, "Pubic CIO Pay Getting Renewed Attention" July 2018; OTPP, Annual Report 2017; New York Times, "Canada Finds Key to Pension Fund Investing" December 2014

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Compensation Components

The compensation structures of many US public pensions lack the incentive features commonly found in the private sector or best-in-class international peers.

General Principals of Pay Design

1. Secure long-term stability
2. Discourage short-term risk taking
3. Maintain oversight by Board of Directors
4. Align investment team with fund goals

Typical Compensation Levers by Entity Type

Compensation Category	Pay Component	Private Sector Managers	SWFs & Leading Global Pensions	US Public Pension Funds
Guaranteed	Base Salary	✓	✓	✓
Variable Compensation	Annual Bonus	✓	✓	✓
Long-Term Compensation	Equity	✓		
	Long-term Incentive Plans		✓	↑
	Carried Interest	✓	✓	Viable Incentive Levers
	Co-Investment	✓		↓

Sources: Korn Ferry, "Insights Around Investment Team Paradigms" May 2019

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CPPIB Compensation Framework

CPPIB's incentive program takes into account the environment in which it operates, its mission, and the strategy it has chosen to execute.

CPPIB Compensation Framework

Aligned with Investment Objectives	• Maximize return to the total Fund with agreed risk parameters • Support CPPIB's Guiding Principles
Market Competitive	• Enable CPPIB to attract and retain the right people
Right Time Horizon	• Align to CPPIB's long-term investment horizon for performance measurement and for payouts
Simple	• Enable differentiation based on individual performance
Enables Application of Informed Judgement	• Use a clear and simple framework that is transparent to stakeholders and employees • Yield increased stability and consistency of performance measurements
Differentiation Based on Individual Performance	• Recognize the distinction of each asset class, strategic and operational objectives, and market conditions

CPPIB Compensation Components

Base Salary

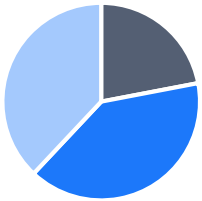
Provide market-competitive pay commensurate with the employee's responsibilities, demonstrated skills, knowledge, and performance

Incentive Compensation Plan

Reward employees with cash awards based on total Fund performance, business results, and individual performance results

Target Mix

Senior Investment Management



Salary	22%
In-year award	40%
Deferred award	38%

Sources: CPPIB, Annual Report (2018)

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Incentive Compensation

At the end of the fiscal year, employees are entitled to an annual award based on total Fund performance, department performance, and individual performance.

Incentive Compensation Plan Framework

Incentive Compensation = **Base Salary** × **Incentive Target** × **Performance Multiplier**

Determination of Performance Multiplier

Factor	**Total Fund Performance** (30%)	**Dept. Performance** (30%)	**Individual Performance** (40%)
Multiplier	0.0x - 2.0x	0.0x - 2.0x	0.0x - 2.0x
Description	Performance relative to the Reference Portfolio and long-term expected return of the Reference Portfolio	Performance based on department business plan scorecard	Assessment of individual performance based on individual objectives

- A portion of Incentive Compensation is paid in-year with the balance subject to a three-year deferral to align with the long-term focus of the Fund.
- Deferred salary is subject to Fund performance overtime.
- The BOD has the ability to claw-back incentive compensation if Fund performance deteriorates.

Sources: CPPIB, Annual Report (2018)

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CPPIB 2018 Total Fund Performance

In 2018, the CPPIB investment team exceeded its five-year total Fund performance targets, earning them a Total Fund Performance multiplier of 1.71x.

2018 Compensation Awards Driven by Excess Performance

Performance Multiplier = **Total Fund Performance** (30%) + *Not Disclosed* **Dept. Performance** (30%) + *Not Disclosed* **Individual Performance** (40%)

Components	5-Year Target	5-Year Actual	Performance Multiplier	
Absolute Performance Absolute total return of the Fund over a five-year period	6.00%	**12.12%**	2.00x	**Total Performance Multiplier = 1.71x**
Relative Performance Value-add relative return of the Fund compared to the Reference Portfolio	CAD $4.3 Bn	**CAD $11.6 Bn**	1.42x	

Note: Absolute Performance and Relative Performance multipliers are equal-weighted in the Total Performance Multiplier.
Sources: CPPIB, Annual Report (2018); Wafra analysis

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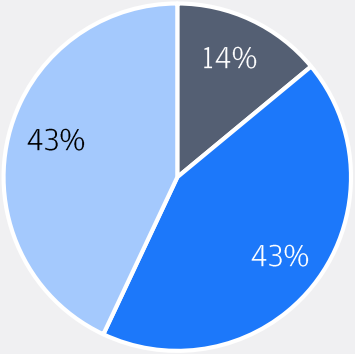
CPPIB Compensation Model In Practice

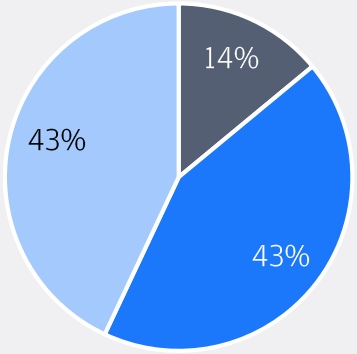
The result of the CPPIB structure ensures that incentive remuneration is the principal component of executive compensation.

2018 CEO Compensation



Base salary	$482,365
In-year award	$1,521,822
Deferred award	$1,521,822
Total	**USD $3,526,009**

2018 Senior Investment Compensation



Base salary	$302,188
In-year award	$892,873
Deferred award	$892,873
Total	**USD $2,087,934**

Note: Senior Investment Compensation only includes employees active for the duration of the fiscal year. Salary expenses for CPPIB are originally reported in CAD $. These were normalized to USD $ using an average 2018 exchange rate of 1.2957 from the Bank of Canada. One Senior employee is paid in GBP and was converted to CAD $ at and exchange rate of 1.72.
Sources: CPPIB, Annual Report (2018); Wafra analysis

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Standing Up Core Infrastructure

Insourcing investment teams also requires hiring additional back office personnel based on volume of assets managed, type of assets, and investment complexity.

Estimating Support FTE Requirements

- A survey of 26 leading pension funds showed they hire 1.7-2.5 back office full-time equivalents (FTEs) for every investment FTE.
- A study of 19 pensions from $12B to $340B in AUM found support FTE by AUM varied from 1.0-1.3 FTE per $1B in AUM.
- The two studies suggest that funds may be able to achieve economies of scale in FTE hiring once a prerequisite level of support functions are hired.
- Passive strategies exhibit greater FTE hiring economies of scale than labor intensive strategies like private equity and real estate, but higher fees associated with externally managing these assets can still make insourcing worthwhile.

Discussed on following pages

Public Pension Survey Respondents' Staffing, by Role

Functional Role	FTE Count
Executive Investment Operations, Support and Custody	36
Asset Allocation	5
Risk Management	8
Corporate Governance	3
Compliance, Internal Audit and Reporting	16
Public Relations	3
Client Account Management	5
Valuation and Performance Analytics	8
IT Applications and Databases	23
IT Hardware and Security	9
Legal	6
Human Resources	5
Office support and Other	7

Sources: PWC, "Best Practices in the pension funds investment process" 2016; Top 1000 Funds, "Your Guide to Internal Staffing Levels" June 26, 2016; CEM Benchmarking, "How Large Pensions Organize Themselves" Spring 2012

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Risk Management Function

In particular, risk management and audit functions are key to the success of insourced investment teams but the functions are often overlooked.

Layers of Risk Management

First Line of Defense — Operational Business Units

- Develop internal risk and control guidelines
- Conduct long-term forecasting and sensitivity tests for specific lines of business
- Ensure staff adhere to firmwide guidelines established by risk and control
- Identify risks associated with strategies within area of expertise
- Comply with audit and risk data requests

Second Line of Defense — Risk and Control Function

- Conduct day-to-day risk management oversight
- Create risk measures
- Monitor compliance with standardized reporting
- Lead relationships with tax and legal authorities
- House additional support risk functions like IT, cybersecurity, legal

Third Line of Defense — Internal Audit

- Perform unbiased and independent assessment of controls
- Define standards, benchmark, and sensitivity guidelines for the firm with input from CEO and Board
- Complete ad hoc risk analysis as needed

Sources: GIC Annual Report (2018)

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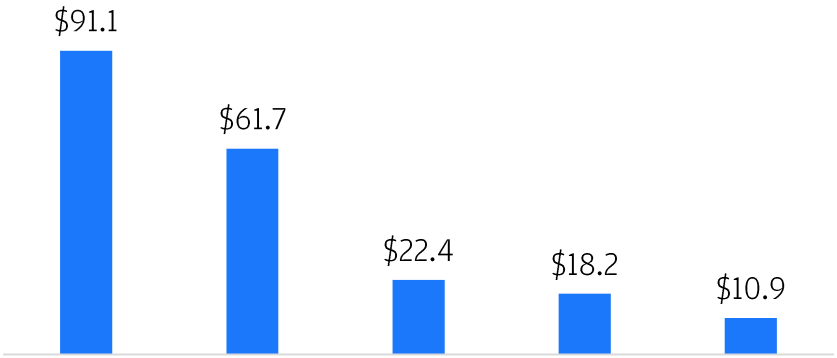
Technology Investment

Technology investment in both talent and software solutions is a critical element of insourcing success.

2018 Technology Expense

USD $ Mn



	CPPIB	CDPQ	OTPP	CalPERS	CalSTERS
% of Assets Managed In-House	95%	90%	80%	69%	60%
Assets (USD Bn)	302.5	238.5	147.4	354.0	223.8

Canadian pensions appear to invest more in technology than their leading US peers, likely due to the complexity of their in-sourced investment programs.

Examples of Technology Use

CPP INVESTMENT BOARD

- CPPIB utilizes their team of data scientists to augment financial due diligence on real estate investments, using non-financial data to forecast demand.
- CPPIB is also hiring a Director of Innovation to manage machine learning and advanced analytics initiatives.

ONTARIO TEACHERS' PENSION PLAN

- OTPP is building an alternative data team of 5 to 15 data scientists to augment OTPP's analytics capabilities.

Note: Technology expenses for CPPIB, CDPQ, and OTPP are originally reported in CAD $. These were normalized to USD $ using an average 2018 exchange rate of 1.2957 from the Bank of Canada.
Sources: Financial Post, "How CPPIB is Tapping Alternative Data" March 18, 2019, Performance Magazine, "The Asset Owners' Conundrum: Insourcing of Asset Management"; Wafra analysis

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Biographies and Disclosures

Wafra

Wafra Consulting Services Team Biographies

Richard Safranek
Senior Managing Director

Richard Safranek is a Senior Managing Director and serves on Wafra's Management Advisory Committee. Mr. Safranek leads all consulting services and research, and manages a broad range of special purpose investment vehicles.

Previously, Mr. Safranek also served as a Portfolio Manager at Wafra, covering equity markets in the Asia-Pacific and Emerging Markets regions. He joined Wafra in 1995. Prior to that, Mr. Safranek served as an Investment Analyst at World-Wide Investment Co., a Hong Kong-based family office, where he conducted economic, political and market research on Hong Kong and China.

Mr. Safranek earned a BA in International Relations from Johns Hopkins University and an MBA from Columbia University. He completed a Chinese language program at Beijing Foreign Language Institute.

Martin Lujan
Vice President

Martin Lujan is a Vice President at Wafra, focusing on research, investment opportunities across functional areas, and providing strategic business and financial consulting services to institutional investors. Previously, Mr. Lujan worked at Barclays PLC in Equities Trading, and in the investment management divisions of Goldman Sachs and Grantham, Mayo, & Van Otterloo (GMO).

Mr. Lujan earned a BA, magna cum laude, in Finance and Economics from the University of New Mexico and an MBA from MIT Sloan School of Management with a concentration in finance.

James Saliba
Vice President

James Saliba is a Vice President at Wafra, focusing on market analysis, research, and providing strategic consulting services across industries. Previously, Mr. Saliba was a Manager with Strategy& (formerly Booz & Company) in New York and the Middle East, where he advised clients on large-scale transformations, supported capabilities-driven growth and performed strategic due diligence for joint ventures and public-private partnership across industries.

Mr. Saliba earned a BS in Mechanical Engineering, cum laude, from Villanova University and both an MBA and an MFin from MIT Sloan School of Management.

Stephen Burt
Senior Associate

Steve Burt is a Senior Associate at Wafra, focusing on strategic consulting projects and financial analysis and performance. Previously, Mr. Burt was a Senior Financial Analyst specializing in strategy and financial planning and analysis for publicly-traded companies where he assessed the strategic and financial impact of potential capital investments. Mr. Burt was also an Associate in the financial services and strategy practice at Booz Allen Hamilton (Middle East) where he advised clients on capital structure design and conducted market research for new strategic initiatives.

Mr. Burt earned a BS, summa cum laude, in Political Science from Texas A&M and an MBA from MIT Sloan School of Management.

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