



## What is the optimal allocation to private equity?

Partners Group Research Flash March 2011



**Partners Group**  
Passion for Private Markets

**André Frei**  
Partner, Chief Risk Officer

**Dr. Michael Studer**  
Managing Director, Risk Management

## What is the optimal allocation to private equity?

### KEY STATEMENTS

- **Although it is hotly debated, modern portfolio theory still represents a major tool for portfolio construction.** Today, there are data providers that track the private equity market and **two decades worth of quarterly data** is a **sound statistical basis** for portfolio optimization.
- Data is based on the valuation of private companies and corresponding cash flows. **Private company valuations typically reflect fair asset values** rather than actual transaction values. Although similar tools are used to value public and private companies, the frequency and focus of valuations vary significantly. As a consequence of private equity valuation mechanics, return series **exhibit auto-correlation**, which, if not corrected for, may distort the results of portfolio optimization.
- Based on historical data series adjusted for auto-correlation, **modern portfolio theory suggests an optimal private equity allocation in the range of 10-30% for an unconstrained investor** depending on risk tolerance.
- *Modern portfolio theory* neglects important parameters such as investment selection, liquidity and regulations. Profound **investment selection skills and access to top quartile managers are key** given the significant return dispersion in private markets. Uncertainty over cash flows of private markets investments requires **sophisticated modeling techniques for both risk management** purposes **as well as portfolio and liquidity management**. Last but not least, **regulation substantially limits degrees of freedom** in asset allocation.



# What is the optimal allocation to private equity?

## EXECUTIVE SUMMARY

Determining overall asset allocation is one of the first and major challenges an investor faces, well before actual investment decisions are made. Looking at the private equity target allocation in the portfolios of institutional investors, one observes a significant variation between European pensions funds, with no or low single-digit allocations, and U.S. institutional investors with allocations in the mid-teens (CalPERS, for example, at around 15%) to over 20% (for various U.S. endowments funds such as Harvard or Yale). Apparently, there is no consensus regarding the optimal private equity allocation. What causes these large differences? Is there one single optimal allocation or is it investor specific?

While *modern portfolio theory*<sup>1</sup> is well established in the context of public market assets such as stocks and bonds, an initial stumbling block for private equity is the access to and the appropriate use of input data. Thomson Reuters, for example, collects and provides long-term cash flow and return data for private equity, which may be used for quantitative studies including diversification. However, such data typically exhibits auto-correlation, which smoothes out volatilities and correlation and, if not corrected for, would increase the optimal allocation to private equity. Un-smoothing the time series for this effect still provides for an allocation to private equity in the range of 10-30% for an unconstrained investor depending on risk tolerance.

Standard portfolio optimization neglects important aspects. First, private equity investments are subject to a significant return dispersion across investment opportunities. Positive or negative selection biases impact returns significantly and need to be considered in the allocation decision. Second, investors only earn returns on invested capital, which may and often does deviate significantly from the target allocation; investors therefore need to carefully analyze the impact and opportunity costs of a potential dilution. Third, in the aftermath of the financial crisis, institutions across the globe are facing tighter regulations, which will either change the cost of capital associated to different asset classes (risk-based capital requirements for insurance companies, e.g. Solvency II in Europe) or introduce outright limits (e.g. Volcker rule).

---

<sup>1</sup> Portfolio Selection, Harry M. Markowitz, Journal of Finance 7, 1952, p. 77-91

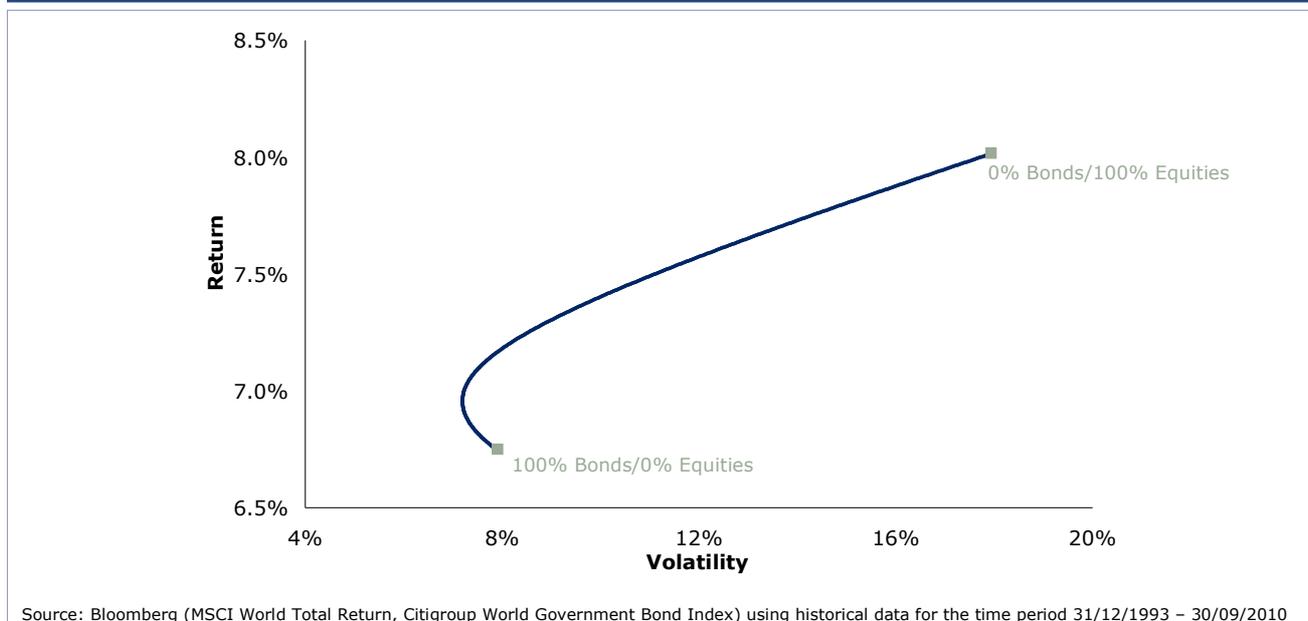


## What is the optimal allocation to private equity?

### OPTIMAL ALLOCATIONS: WHAT DO TEXTBOOKS TELL US?

*Modern portfolio theory* strives to optimize an investor's allocation across asset classes and in consideration of the investor's risk tolerance. The parameters risk (measured as volatility), returns and correlations are the input variables to optimize the return for a given risk. Exhibit 1 illustrates the efficient frontier for a traditional portfolio consisting of stocks and bonds only. All portfolios along the curve are "efficient" in the sense that investors cannot create a non-levered portfolio with the same return but a lower risk, or the same risk but a higher return. Herein we will focus on the Minimum Variance portfolio (i.e. the portfolio with the lowest risk) and the Maximum Sharpe portfolio (i.e. the portfolio that maximizes the Sharpe ratio<sup>2</sup>). Calculating these optimal allocations for portfolios containing only public stocks and bonds results in a bond allocation of around 80% (Minimum Variance portfolio) and 75% (Maximum Sharpe<sup>3</sup> portfolio) based on historical data.

**Exhibit 1: Standard efficient frontier for a simple public market portfolio**



While *modern portfolio theory* is still one of the major tools for portfolio construction, it is hotly debated amongst both practitioners and researchers. People question to what extent the assumptions of standard portfolio optimization are justified or violated. In addition, the composition of optimal portfolios might not always seem feasible. When moving along an efficient frontier (i.e. for varying risk tolerances), the portfolio composition can change substantially with just a small move of the target risk and the portfolio composition often even completely neglects entire asset classes. This sensitivity makes portfolio optimization more of an art than a science and the results should often be considered as general guidance rather than a strict directive. The recent financial crisis painfully demonstrated that asset allocation should not depend solely on quantitative models and historical time series. Additional parameters such as duration and liquidity must be taken into consideration. Last but not least, investors need to carefully analyze the availability and characteristics of input data.

<sup>2</sup> Mutual Fund Performance, William F. Sharpe, Journal of Business, January 1966, p. 119-138

<sup>3</sup> The Sharpe ratio is a measure for risk-adjusted performance and is defined as the expected excess return of an asset over the risk-free rate divided by the asset's volatility

## What is the optimal allocation to private equity?

### PRIVATE EQUITY VALUATIONS, FLAWED OR TRUSTWORTHY?

High quality return data for stocks and bonds is available for long time periods and for nearly every frequency. In order to add private equity in an asset allocation context, investors often face the challenge of incorporating relevant historic data into their models. Today, there are several data providers that track private equity data. It is, however, important to analyze the differences between private and public market valuation mechanics.

Exhibit 2 shows the mechanics and tools that are used to value public and private companies. Not surprisingly, the same tools are used and in both cases investors are trying to assess the value of a company. The frequency of valuations, however, varies significantly: real-time quotes in information systems like Bloomberg suggest that the valuation of a public company changes instantaneously. In contrast, private market investments are typically only valued on a quarterly basis or once they are transacted, which may happen only every few years. In addition, while valuations for public companies are typically based on projections by stock analysts, private equity valuations are generated by the owners of the company based on all information about the current status and the anticipated development of the company ("legal insiders"). Often these private market valuations are based on trailing performance figures ("current value approach").

#### Exhibit 2: Public and private market valuations make use of the same tools, but have a different focus

Public markets approach	Tools	Private markets approach
Short term sentiment	Discounted cash flows  Comparables	Long term focus
Instantaneous valuations		Quarterly valuations
Projections into the future ("forward P/E")		Current value approach ("last twelve months")

Source: Partners Group

While the focus and frequency of these valuations may differ, the valuation tools largely coincide. Because private companies' valuations are supposed to reflect the fair asset value rather than an actual transaction value, one might argue that the valuations of private companies are flawed (and should not be used for portfolio optimization). We argue that private equity valuations are generally no worse at reflecting prevailing company values than public market valuations. Naturally, one would expect valuations to depend on the general well-being of the economy as both private as well as public companies generally fare better in a benign economic environment. This is confirmed by the valuation ratio, which we define as positive valuation changes over negative valuation changes of private investments (i.e. similar to the bull/bear ratio known in public markets). We compare the valuation ratio with GDP growth in Exhibit 3 and find that private equity valuations are indeed moving largely in line with GDP growth. Some investors fear that general partners planning to raise the next fund might be tempted to inflate the valuations in order to show a better track record; however, research has shown that there is no positive bias in the valuations of private equity investments<sup>4</sup>.

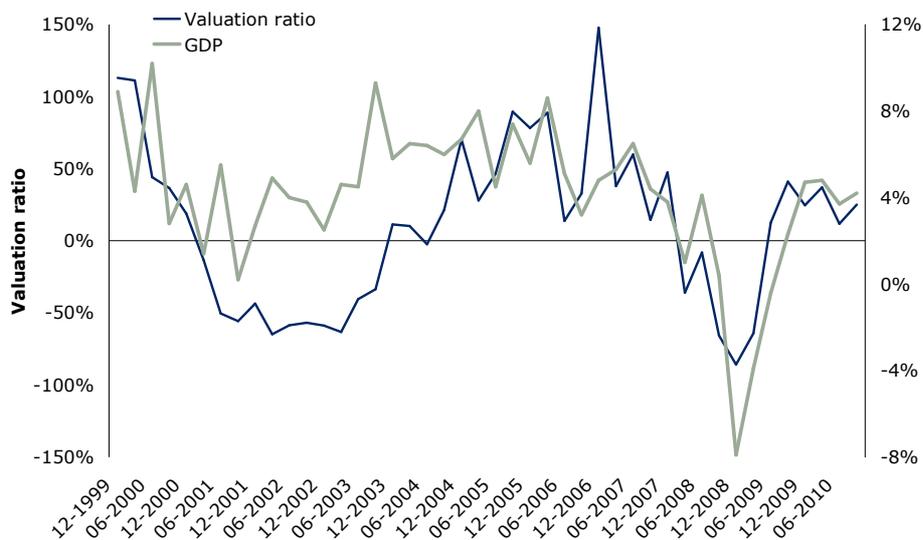
<sup>4</sup> Private Equity Managers do not overvalue their company investments, Andreas Kemmerer, Tadeusz Lutoborski, Mark Wahrenburg, Tom Weidig in G.N. Gregoriou, M. Kooli, R. Kräussl, Venture Capital in Europe, Elsevier, 2006, p. 157-170

## What is the optimal allocation to private equity?

One also observes that private market valuations are not necessarily adjusted on a quarterly basis if there is no significant change of the underlying company's performance figures (e.g. EBITDA). We measure that up to 40% of valuations remain unchanged each quarter on average. This is not an issue for strategic private market investors who appreciate the long-term nature of the asset class and do not demand a tradable price as in public markets. This long-term focus of private equity valuations causes an auto-correlation in return series. In essence, this means that the quarterly return for period T+1 is correlated with the return of period T (and potentially previous periods). While we claim that private market valuations are relevant for modeling purposes, the auto-correlation should be addressed for our portfolio optimization.

### Exhibit 3: Private equity valuations are moving in line with GDP

**Quarterly valuation ratio calculated as number of positive valuation changes to negative valuation changes compared to GDP.**



Source: Partners Group and Federal Reserve Bank of St. Louis

### OPTIMIZING FOR PRIVATE EQUITY

While high frequency data of return time series of stocks and bonds exhibit auto-correlation, statistical tests for auto-correlation are typically not significant for broad index data at monthly or quarterly frequencies. In contrast, alternative asset classes such as private equity (as well as several hedge fund strategies) exhibit auto-correlation even at quarterly frequencies. The fact that quarterly returns are thus, to some extent, dependent on the returns observed in previous quarters smoothes time series and reduces the measured volatility and the correlation with other asset classes. Since volatility and correlation are the input variables for portfolio optimization, auto-correlation in time series would naturally impact the result of portfolio optimization.



## What is the optimal allocation to private equity?

There are techniques that allow for the "un-smoothing" of time series (see Conner<sup>5</sup>, for example). Using these methods, one can determine an adjusted volatility and adjusted correlation of the underlying economic process and use these underlying parameters as input variables for portfolio optimization rather than original private market return series.

Even based on adjusted parameters, modern portfolio theory suggests an 11% allocation to private equity for the Minimum Variance portfolio and a 27% allocation for the Maximum Sharpe portfolio (see Exhibit 4) based on adjusted historical data. Interestingly, public equities do not receive any allocation in these two portfolios and private equity basically takes the place of public equity. For long-term investors with corresponding risk profiles and a high tolerance vis-à-vis illiquidity, such a move may actually make sense. As initially discussed, investors will need to base their portfolio allocation not only on historical data but also on their outlook of expected future returns.

### Exhibit 4: Optimal allocations for portfolio with traditional and alternative assets

**Private equity figures denote broad pooled average buyout industry returns with North America and Western Europe being equally weighted. Series are corrected for auto-correlation.**

	Maximum Sharpe	Minimum Variance
Citigroup World Gov Bonds	56%	64%
MSCI World Total Return	0%	0%
CS/Tremont Hedge Fund Index	17%	25%
Private Equity	27%	11%

Source: Bloomberg (quarterly returns in local currencies), Thomson Reuters (Cash flow summary report), period 1/1/1994 – 30/06/2010

### IT'S NOT THE END OF THE STORY

As mentioned before, modern portfolio theory focuses on volatility, returns and correlations as input parameters. In our opinion, there are, however, various dimensions not covered in this framework that are very important in the actual asset allocation decision.

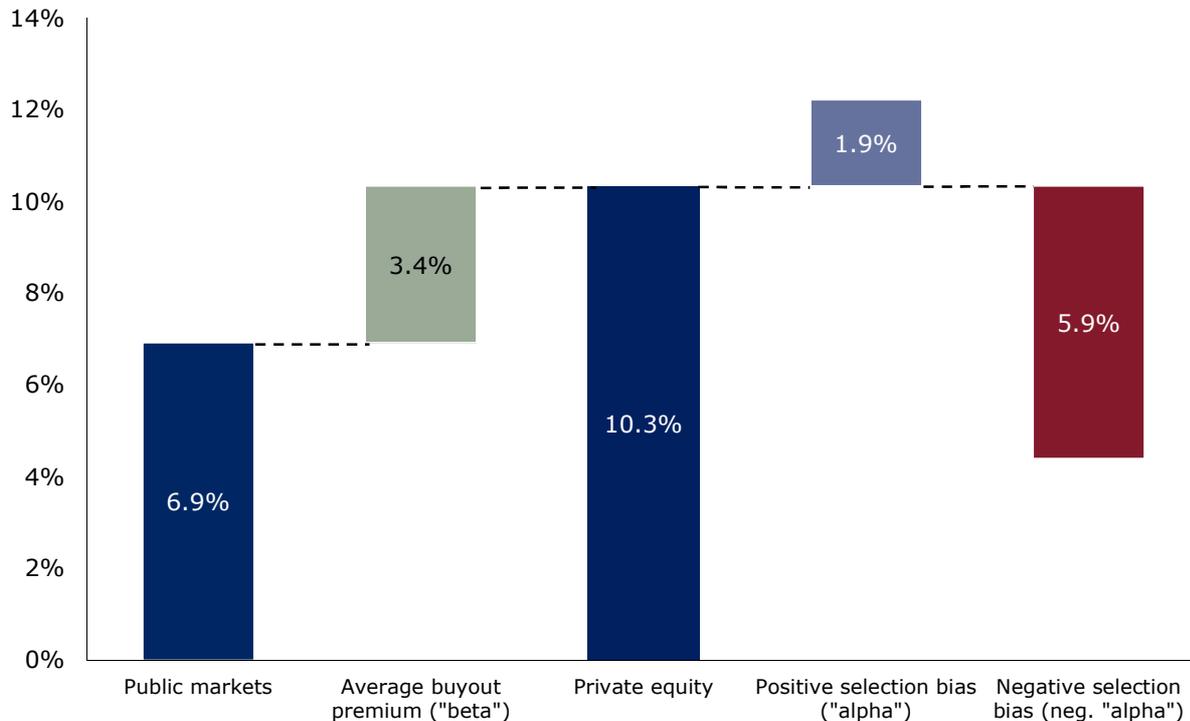
**Portfolio optimization is typically based on long-term broadly diversified industry data.** This does not take into account a potential positive/negative selection bias. As a matter of fact, private equity exhibits a large dispersion between top and bottom performers. The data from Thomson Reuters illustrated in Exhibit 5 underlines the importance of this investment selection. Comparing North American buyout industry returns with the S&P 500 shows that the broad buyout market outperforms the S&P 500 by around 300 basis points. An investor that is able to identify and avoid bottom-quartile investment opportunities is able to increase the outperformance to nearly 5%; if such outperformance is factored in, the investor would naturally increase the allocation to private equity in a Maximum Sharpe portfolio. On the other hand, an investor that is not able to identify and access top quartile opportunities is likely to underperform a public market portfolio; if such underperformance is factored in, there would consequently be no private equity allocation in the optimal portfolio.

<sup>5</sup> Asset Allocation Effects of Adjusting Alternative Assets for Stale Pricing, A. Conner, The Journal of alternative Investments, Winter 2003, p. 42-52

## What is the optimal allocation to private equity?

### Exhibit 5: Industry data does not account for an investment selection bias

**Positive selection bias refers to the pooled performance of funds that are not in the bottom quartile. Negative selection bias refers to the pooled performance of funds that are not in the top quartile.**



Source: Thomson Reuters (NAM BO fund performance report as of June 30, 2010) and Bloomberg (S&P 500 TR since 1994) for public markets.

**The uncertainty of cash flows of private markets investments adds another dimension in our portfolio optimization effort.** Using sophisticated modeling, investors need to estimate their future cash flows based on their prevailing portfolio and their unfunded liabilities; actual cash flows will depend on many exogenous factors. The input data used for the optimization implicitly assumes that the investor is always fully invested. Given the uncertainty of future cash flows, investors, however, face the difficulty of achieving and maintaining their target investment level over time. Opportunity costs from being under- or overinvested can be significant due to the illiquidity of the asset class and the substantial discounts possible in the case of forced secondary sales, which may erase the entire return benefits. It is clear that portfolio optimization of industry data does not take these opportunity costs into account.

**Further important factors to be considered for portfolio optimization include liquidity considerations and regulations.** Regulators world-wide are imposing new rules for insurance companies that shift the focus from asset-based capital requirements to risk-based capital requirements. Similarly, banks are facing additional capital requirements from Basel III and the Volcker rule. These regulations will further restrict degrees of freedom in asset allocation.



## What is the optimal allocation to private equity?

### **CONCLUSION**

What is the optimal allocation to private equity? From a standard portfolio optimization point of view, an unconstrained investor may allocate 10% or even up to 30% of overall assets to private equity. Individual investors' preferences, different levels of investor sophistication and regulations will however continue to yield very different answers to this question in practice.



## Contact

**Client contact:**

Kathrin Schulthess

Investment Solutions

Phone: +41 41 768 85 81

Email: [kathrin.schulthess@partnersgroup.com](mailto:kathrin.schulthess@partnersgroup.com)

**Media relations contact:**

Dr. Anna Hollmann

Phone: +41 41 768 83 72

E-mail: [anna.hollmann@partnersgroup.com](mailto:anna.hollmann@partnersgroup.com)

[www.partnersgroup.com](http://www.partnersgroup.com)



## Disclaimer

This material has been prepared solely for purposes of illustration and discussion. Under no circumstances should the information contained herein be used or considered as an offer to sell, or solicitation of an offer to buy any security. Any security offering is subject to certain investor eligibility criteria as detailed in the applicable offering documents. The information contained herein is confidential and may not be reproduced or circulated in whole or in part. The information is in summary form for convenience of presentation, it is not complete and it should not be relied upon as such.

All information, including performance information, has been prepared in good faith; however Partners Group makes no representation or warranty express or implied, as to the accuracy or completeness of the information, and nothing herein shall be relied upon as a promise or representation as to past or future performance. This material may include information that is based, in part or in full, on hypothetical assumptions, models and/or other analysis of Partners Group (which may not necessarily be described herein), no representation or warranty is made as to the reasonableness of any such assumptions, models or analysis. Any charts which represent the composition of a portfolio of private markets investments serve as guidance only and are not intended to be an assurance of the actual allocation of private markets investments. The information set forth herein was gathered from various sources which Partners Group believes, but does not guarantee, to be reliable. Unless stated otherwise, any opinions expressed herein are current as of the date hereof and are subject to change at any time. All sources which have not been otherwise credited have derived from Partners Group.

**Material notes to investors based in the People's Republic of China** This material is presented to investors by Partners Group's Beijing Representative Office on behalf of Partners Group (Singapore) Pte Limited. Partners Group's Beijing Representative Office is not representing any other entity (including, without limitation, Partners Group AG). Partners Group's Beijing Representative Office is engaged solely in the conduct of market research and liaison activities and is not engaged in direct business operations in accordance with the Regulatory Measures for Registration of Representative Offices of Foreign Companies, Article 3. Any products referenced herein have not been submitted to or approved/verified by or registered with the China Securities Regulatory Commission or other relevant governmental authorities in the PRC. Such products may not be offered, sold or delivered or available for reoffering, resale or redelivery directly or indirectly to any person in the PRC, other than in full compliance with the relevant laws and regulations of the PRC. PRC investors are responsible for obtaining all relevant government regulatory approvals/licences, verifications and/or registrations.

**Material notes to investors based in Australia** Partners Group (UK) Limited ABN 41 130 021 484 is exempt from the requirement to hold an Australian financial services licence by operation of ASIC Class Order 03/1099: UK FSA regulated financial service providers. Partners Group (UK) Limited is regulated by the Financial Services Authority of the United Kingdom under UK laws, which differ from Australian laws.

**Material notes to investors based in Japan** The registration number for Partners Group AG in Japan is Kanto Financial Bureau No. 2141 (Financial Instruments Business). The Financial Instruments Mediation Assistance Center ("FINMAC") is the appropriate financial arbitrator for any complaints or disputes regarding our financial products and transactions (FINMAC +81 3 3667 8009).

**Material notes to investors based in the United Kingdom** This material is presented to investors by Partners Group (UK) Limited, which is regulated by the UK Financial Services Authority ("FSA"). Any product offered will be an unregulated collective investment scheme for the purposes of the Financial Services and Markets Act 2000 of the United Kingdom ("FSMA 2000"). The promotion of any product and the distribution of any associated material is accordingly restricted by law. Any product related material is therefore issued by Partners Group (UK) Limited only to persons who are of a kind to whom such product may lawfully be promoted under the Financial Services and Markets Act 2000 (Promotion of Collective Investment Schemes) (Exemptions) Order 2001 ("CIS Order") and Rule 4.12 of the Conduct of Business Rules published by the FSA ("Relevant Persons").

**Material notes to investors based in the United States of America** This material is presented to investors on behalf of Partners Group AG. Statements herein do not necessarily pertain to Partners Group (USA) Inc. or Partners Group Real Estate, LLC, which are SEC registered investment advisers and affiliates of Partners Group AG. For information specifically regarding Partners Group (USA) Inc. or Partners Group Real Estate, LLC, please contact us.

**Material notes to investors based in the Dubai International Financial Centre** This material relates to a financial product which is not subject to any form of regulation or approval by the Dubai Financial Services Authority ("DFSA"). The DFSA has no responsibility for reviewing or verifying any prospectus or other documents in connection with this financial product. Accordingly, the DFSA has not approved this document or any other associated documents nor taken any steps to verify the information set out in this document, and has no responsibility for it. The financial product to which this document relates may be illiquid and/or subject to restrictions on its resale. Prospective purchasers should conduct their own due diligence on the financial product. If you do not understand the contents of this document you should consult an authorised financial adviser.

**Material notes to investors based in Canada** We are required by applicable securities law in Canada to notify you as follows: We are not registered as an adviser in Canada. We provide our services in Canada as an exempt international adviser. Our principal office is located in Baar/Zug Switzerland. There may be difficulty enforcing legal rights against us because we are resident outside Canada and all or substantially all of our assets may be situated outside of Canada. We have appointed agents for service of process in Canada, depending on your jurisdiction. Please see the below Schedule for the list of our agents and their addresses.

Province/Territory	Agent for service	Province/Territory	Agent for service
Ontario	Blakes Extra-Provincial Services Inc., Suite 2800, 199 Bay Street, Toronto, ON M5L 1A9	Saskatchewan	MacPherson, Leslie & Tyerman LLP, 1500 Continental Bank Building, 1874 Scarth Street, Regina, SK S4P 4E9
Quebec	Services Blakes Québec Inc., 600 de Maisonneuve Boulevard Ouest, Suite 2200, Tour KPMG, Montréal, QC H3A 3J2	Nova Scotia	Stewart McKelvey, Purdy's Wharf Tower One, 1959 Upper Water Street, Suite 900, P.O. Box 997, Halifax, NS B3J 2X2
British Columbia	Blakes Vancouver Services Inc., 595 Burrard Street, P.O. Box 49314, Suite 2600, Three Bentall Centre, Vancouver, BC V7X 1L3	New Brunswick	Stewart McKelvey, 10th Floor, Brunswick House, 44 Chipman Hill, Saint John, NB E2L 4S6
Alberta	Blake, Cassels & Graydon LLP, Attention: Pat Finnerty/ Ross Bentley, 855 - 2nd Street S.W., Suite 3500, Bankers Hall East Tower, Calgary, AB T2P 4J8	Newfoundland and Labrador	Stewart McKelvey, Cabot Place, 100 New Gower Street, Suite 1100, P.O. Box 5038, St. John's, NL A1C 5V3
Manitoba	Aikins, MacAulay & Thorvaldson LLP, 30th Floor, Commodity Exchange Tower, 360 Main Street, Winnipeg, MB R3C 4G1	Prince Edward Island	Stewart McKelvey, 65 Grafton Street, Box 2140, Charlottetown, PE C1A 8B9

