Alternative Investments

Improving portfolio performance | Aura Solution Company Limited

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1. Introduction

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The last 30 years have seen a steady growth and acceptance of alternative asset classes in institutional portfolios as investors seek diversi ed sources of income and return. These asset classes are sometimes called illiquid or private asset classes because one important characteristic is that they are not publicly listed in markets or no active dealer market exists. Past success of these asset classes, continuous innovation, and the ongoing low interest rate environment are the main drivers of this growth.

One way to divide the alternative universe is into private capital investments and other strategic investments. Within private capital there are real estate, private equity, private debt, and infrastructure and natural resource investments. The two strategic investment categories that we consider are hedge funds and commodities.

The largest sectors of the alternatives world are private equity, real estate and hedge funds with private debt gradually getting more attention and fund ows.

One characteristic of alternatives is that these assets classes are far more dif cult to implement. Except for commodities, there are no low-cost index funds. They require higher levels of oversight and management than those offered in the public markets. Additionally, due to the closed-end nature of many of the investments, continuous search costs are necessary, thus requiring either sophisticated staffs to build and maintain these portfolios or high out-sourcing costs. Hedge funds require a high degree of active management both at the fund level and the total portfolio level.

How are investors adjusting their allocation to alternatives, and what are the results? In this paper we will look at the size and variety of alternative investment categories, expected returns and risk, and how investors can incorporate them into their portfolios.

There are many ways to classify alternatives. Like the public markets, there are equity funds and debt funds, but what really distinguishes them from the public markets is their liquidity, which ranges from illiquid investments requiring a years-long commitment to markets with near daily liquidity.

Exhibit 1: The alternative assets universe

Illiquid	**Growth**	**Debt**	**Other**
Mostly closed-end funds with few if any transactions at NAV. Performance measures: IRRs, DPIs, PMEs. Analytic tools: Cash ow models with contributions and distributions.	– Traditional private equity *Venture capital, buyout, growth* – Infrastructure – Real estate *Opportunistic, value-added*	–Distressed –Private credit/direct lending –Mezzanine –Mortgage –Infrastructure	– Some hedge funds
Semi-liquid	**Growth**	**Debt**	**Other**
Mostly open-end funds with some transactions at NAV. Quarterly liquidity available, queues possible. Preformance measures: TWRR from appraised NAVs. Analytic tools: Mean variance somewhat helpful.	– Core real estate	– Mortgage – Leveraged loans	– Most hedge funds
Very liquid	**Growth**	**Debt**	**Other**
Market pricing, near daily liquidity. Performance measures: TWRR on market transactions. Analytic tools: Mean variance very helpful.			– Commodities – Liquid hedge fund strategies

Because of illiquidity, many of these asset classes don't have actual transactions to assess short term performance. Instead, they rely on net-asset-values (NAVs) based on appraisals, which can distort short run performance. For long term performance, these asset classes rely on cash ows with
the traditional measure being the internal-rate-of-return (IRR). Other measures such as the Public Market Equivalent (PME) are gaining attention. Right now, it is still very dif cult to obtain good measures of risk in these asset classes to compare to traditional asset classes.

Another feature of alternatives is the almost exclusive reliance on active management. Commodities are the only alternative asset class that can run systematic or passive strategies at low cost. This adds on an additional layer of risk in these asset classes: manager performance.

By and large, the historic performance of alternatives has been in line with expectations with return and risk pro les that
can help investors build better portfolios. Going forward, we expect more muted returns, in part due to the current market conditions that we see in the public markets (low interest rates and potentially stretched valuations in equities), but also because of the enormous amounts of capital that has own into these sectors.

1.1. Who invests in alternatives?

At the institutional level, we see four groups of major investors into alternatives: large public funds, endowments, growth-oriented sovereign wealth funds and family of ces.

The most aggressive users are US university endowments, some with allocations as high as 60%. Yale University started this trend in the 1980s and is now over 75% invested in alternatives. It is the norm to see 40% to 60% allocations
to alternatives in large endowments. Global family of ces allocated an average 37% to a variety of alternatives according to a recent survey[1]. Mega funds like large public pension plans and sovereign wealth funds typically allocate 15% to 25% to alternatives and are considering increasing their alternatives allocation.

Private (corporate) de ned bene t pension plans in the US are smaller players in alternatives as they are gradually adopting liability-driven investing. In the de ned contribution market, historically US plans have been negligible players, but recent regulation encourages some innovation. Superannuation funds in Australia have been more receptive to alternatives, but still have very small allocations. In aggregate, the insurance market is huge, so even small allocations of 1% means they are signi cant players, but they tend to focus on real estate and debt funds and shy away from private equity and hedge funds. Statutory reserve requirements in the insurance industry make meaningful allocations to alternatives problematic for general accounts.

Exhibit 2: Alternatives allocations by sample investors

Type *Entity*	**Public pension plans** *CalPERS*	**Sovereign wealth fund** *GIC (Singapore)*	**University endowment** *Yale University*	**Global family of ce** *121 surveyed*
Size (in billions USD)	355.8	>100	30	1.6 (average)
Date	March 2020	March 2020	June 2019	May 2020
Allocation (%)				
Equities	49	30	17	29
Fixed income & Cash	31	50	7	30
Other	–	–	–	6
Alternatives	*8*	*13*	*38*	*16*
Private equity				
Infrastructure	–	–	–	–
Real estate/real assets	*13*	*7*	*10*	*14*
Natural resources	–	–	*6*	–
Hedge funds	–	–	*23*	*5*
Commodities	–	–	–	–
Alternatives as % of portfolio	**20**	**20**	**77**	**35**

1 The Global Family Of ce Report 2020, Aura Global Wealth Management, July 2020.

1.2. Market size

We look at several measures when we estimate the size and opportunity set of the alternative market. We have to combine various types of data often with different dates and some of which will overlap with the public markets (hedge funds, for example), and others which are based on fund level data, not security level data (which can also overlap with
market measures). Thus, getting an estimate of the size of the alternative universe is not easy.

First, we look at the public equity and xed income markets. As of June 2020, we estimate the size of the public equity market at USD 53 trillion and the xed income market at USD62.9 trillion, which gives a total of about USD116 trillion of public assets of debt and equity. Additionally, for December 2019 we have estimates of USD9.55 trillion of direct real estate assets and about USD3.0 trillion held in gold. To this opportunity set, we can add the closed-end funds of private assets (private equity, private debt, infrastructure and natural resources) of about USD4.8 trillion.

Thus, we de ne the Base Market as the sum of the public assets, direct real estate and closed-end funds, which is approximately USD134 trillion.

We now add in hedge funds, and open-end real estate and commodity funds. But hedge funds are generally using existing public assets and real estate funds consist of existing real estate investments; thus, we are technically double counting the opportunity set when we include them. Commodity funds, which we estimate to be about USD250 billion are another nuance to deal with.

Exhibit 3: The opportunity set for institutional investors (in USD billions)

	Base market	Additional strategies	Dry powder[1]	% of base market[2]
Public Equities[3]	52,956	–	–	39.5%
Public xed income[4]	63,929	–	–	47.6%
Private Real Estate[5]	9,553	–	–	7.1%
Hedge funds[6]		– 3,177	–	2.4%
Commodities[7]		– 250	–	0.2%
Gold[8]	3,000	–	–	2.2%
Closed-End Funds[1]				
Private Equity	3,202		1,534	2.4%
Infrastructure		420	223	0.3%
Private debt		576	269	0.4%
Natural resources		557	256	0.4%
Real estate		– 704	364	0.5%
Total[9]	**134,193**	**4,131**	**2,646**	**103.1%**
Total alternatives				
Private Real Estate	–	–	9,553	–
Hedge Funds	–	–	3,177	–
Commodities	–	–	250	–
Gold	–	–	3,000	–
Private Equity	–	–	3,202	–
Infrastructure	–	–	420	–
Private Debt	–	–	576	–
Natural Resources	–	–	557	–
Total	**–**	**–**	**20,735**	**15.5%**

1. Preqin data, Dec 2019
2. Percentage of Base Market or Additional Strategies to Total of Base Markets
3. FTSE World, June 2020
4. Bloomberg Barclays Multiverse June 2020
5. MSCI IPS data December 2019
6. HFRI June 2020
7. Aura AM estimate
8. World Gold Council, Jan 2020
9. Due to additional funds and overlaps, total will be be greater than 100%

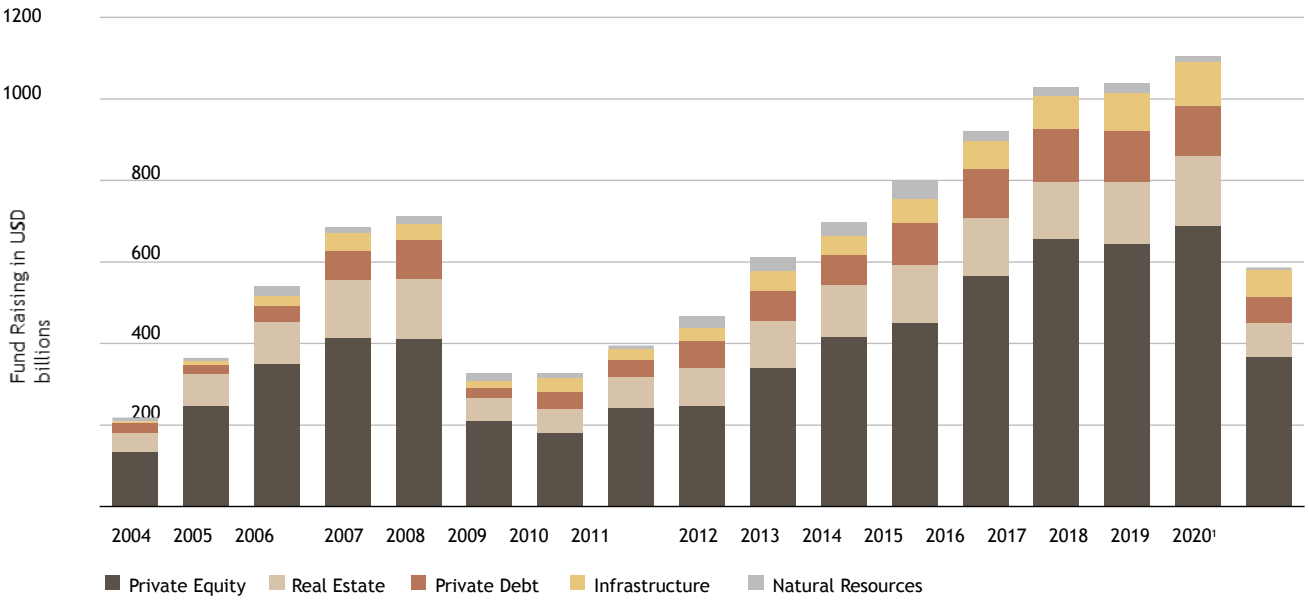
Still we can compare the total size of the alternative marketplace of by adding in the Base Market alternatives with the hedge funds and commodity funds, and real estate funds.

In aggregate we estimate the size of the alternative market for institutional investors to be about USD20.7 trillion or about 15.5% of the Base Market. Other measures of market size are fundraising and committed cash that has not been called (aka
- dry powder). There is a huge amount of dry powder in this segment – USD2.6 trillion.

Another measure of the market is the amount of fund raising. As shown in Exhibit 4, fundraising is highly cyclical, rising rapidly in bull markets and dropping in the aftermath of bear markets.

Traditionally, the private credit markets consisted of mezzanine, distressed debt and real estate mortgages. In the last dozen years, the biggest growth in the private debt market is in direct lending, driven by post- nancial crisis bank lending restrictions and attractive returns. It has gone from years of below USD1 billion in fundraising in early 2000s to years of USD25 billion (peak of USD59 billion in 2017).

Exhibit 4: Fundraising by year



1 Year to date as of 30 August 2020
Source: Preqin

1.3 Historic risk and return: Alternatives and traditional asset classes

Exhibit 5 presents historical performance statistics of some major traditional and alternative assets. These statistics convey some of the important relationships in alternative investments.

- Private equity is expected to have a higher return than public equities. The differential here is over 4% and volatility re ects appraised value volatility, not economic risk of illiquidity and leverage. This 4% premium is supported by comparing median IRRs with 6-year rolling performance of equity markets.

- Unlevered property has a return and risk between stocks and bonds.

- Not shown, but as this sector leverages up (e.g., in opportunistic funds), the returns and risks approach equities.

- A diversi ed portfolio of hedge funds has bond-like volatility and bond-like return and a beta around 0.3 to the equity market.

- Commodities have equity-like volatility, returns around cash and a low, but positive correlation with equities.

However, we need to be careful how we interpret these performance numbers. Estimating alternatives performance is complicated by what is called 'stale pricing,' the slow adjustment of appraised valuations embedded in the net asset value (NAV). The result is that the volatility based on NAVs – especially those that do not trade – is lower than what the market (or economic) volatility would be based on market transactions. There are also issues about survivor-bias and selection-bias in the indices because fund managers are not required to disclose their returns publicly.

Exhibit 5: Summary statistics: 1Q 1994-1Q2020

	Private Equity	Real Estate	Hedge Funds	Comm-odities	T-Bills	10-year Treasury	S&P 500
Estimates based on quarterly returns							
Geometric Return	13.7	9.2	4.3	1.2	2.3	5.4	8.9
Arithmetic Return	13.6	8.9	4.5	2.7	2.3	5.6	9.9
Standard Deviation	10.1	4.1	7.0	16.7	1.0	8.2	16.1
Quarterly Serial Correlation	0.35	0.85	0.19	0.16	0.98	-0.01	0.01
Equity correlation	0.77	0.20	0.72	0.30	0.03	-0.48	1.00
Equity beta	0.48	0.05	0.31	0.31	0.00	-0.24	1.00
Skew	-0.6	-2.9	-0.7	-0.9	0.3	0.7	-0.7
Kurtosis	2.4	11.8	3.2	2.0	-1.5	0.7	0.7
Estimates based on annual returns							
Standard Deviation	14.8	7.5	8.3	18.0	2.0	7.2	17.3
Annual Serial Correlation	0.20	0.35	-0.12	-0.01	0.85	-0.21	0.20
Equity Correlation	0.80	0.28	0.65	0.29	0.10	-0.34	1.00
Equity Beta	0.68	0.13	0.31	0.29	0.01	-0.14	1.00
Skew	-0.7	-2.4	-0.1	-0.4	0.3	0.0	-0.7

Data

Private Equity	Cambridge Associates US Private Equity
Property	NCREIF Property
Hedge Funds	HFRI Fund of Funds Composite USD
Commod	Bloomberg Commodity TR USD FTSE
T-Bills	Treasury Bill 1 Mon USD
10-yr Treasury	BBgBarc US Trsy Bellwethers 10Y TR
S&P 500	USD S&P 500 TR USD

Source: Morningstar Direct. Analysis by Aura Asset Management. Data as of 30 June 2020.

To get a sense of how large this impact could be, we provide two estimates of volatility and serial correlation for alternatives over the last 26 years: one based on quarterly data and one based on rolling annual estimates.

Note that the serial correlations based on quarterly data are quite high, especially for property. We believe this is a sign of stale pricing. Cash has a different serial correlation issue as central banks have large control over these yields and sAura equent returns. When we simply look at annual data, serial correlation declines.

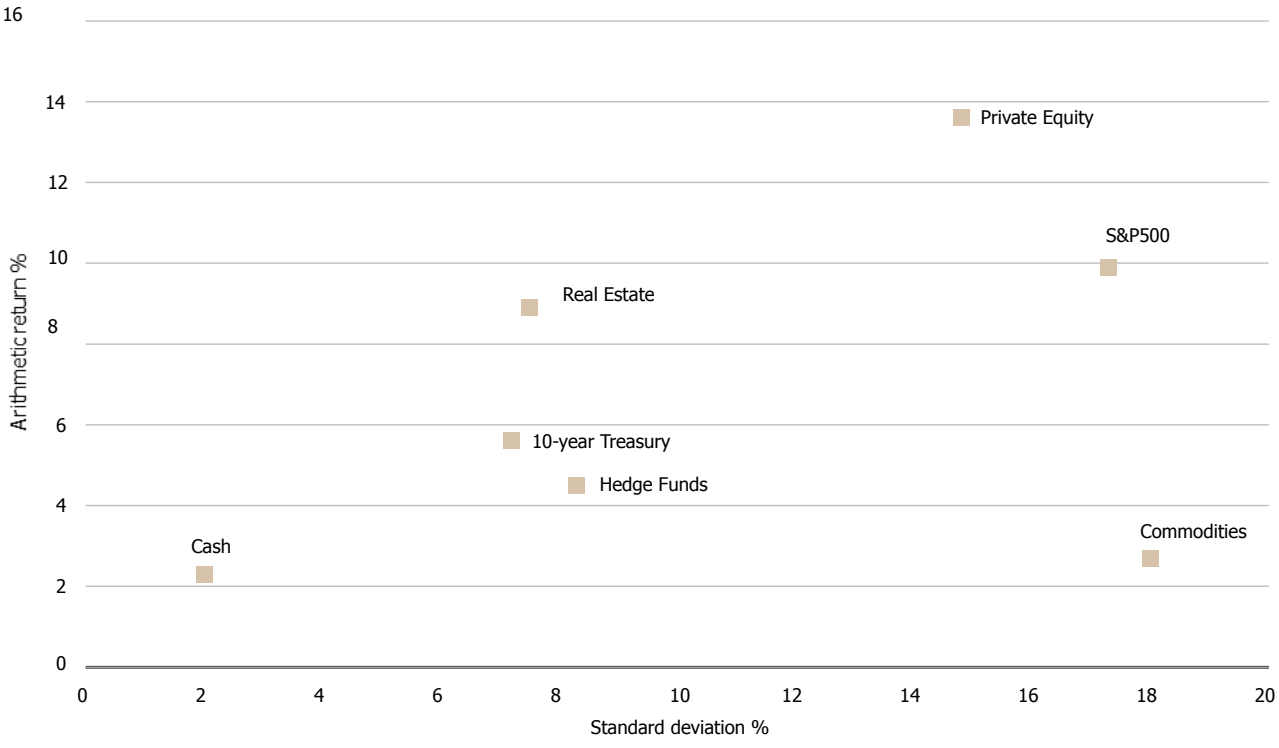
Once we move to annual estimates, we have notable increases in the volatility of private equity (from 10.1% to 14.8%), unlevered property (4.1% to 7.5%) and hedge funds (7.0% to 8.3%). We believe annual estimates provide clearer insight, but still don't re ect all the risks associated with alternatives.

Additional items to consider are the equity correlation and equity beta. When adjusted to the annual level, we see private equity having an equity correlation rising from 0.77 to 0.80 and equity betas rise from 0.48 to 0.68.

Real estate exhibits a similar pattern in relationship to equities, though more muted. The quarterly data shows a lower correlation than the annual data (0.20 compared to 0.28) and equity beta increases from 0.05 to 0.13.

These historic performance numbers give a good showing of the relationship for returns, but not for risks. In particular, because of the stale pricing problems, we believe that the volatility of real estate and private equity underestimate the true risks of these investments. We estimate an 'economic' risk as opposed to NAV volatility. Hedge fund volatility
is a different issue, as the market is far more liquid and competitive than the high growth era of the late 1990s and early 2000s.

Exhibit 6: Return and risk: 1994–2020



Data provided by Morningstar Direct
Analysis by Aura Asset Management. As of 30 June 2020.

1.4. The liquidity risk premium and appraised versus economic risk

Compensation for illiquidity is one of the rationales for higher expected returns in alternative investments. From the demand side, by giving up the option to sell at the investor's
convenience, the investor is meant to be rewarded with higher cash ows.

However, demand for a premium must be supplied by some economic mechanism and it is these economic risks that we should be measuring and managing, not the appraised ones. There are many mechanisms through which alternative managers can create these transformations, especially when aided by explicit rules limiting when pay-outs can occur (thus, eliminating market pricing as well as panic selling by
investors). The most obvious way to model this transformation mechanism is simple leverage in the equity or xed income markets without the constraint of margin management. Other methods are to take on maturity mismatches or sAura titute with higher levels of credit risk. A nal mechanism may be used of various option writing strategies that can produce high Sharpe ratios in the short and intermediate run, but have tremendous downside risk when tail-events happen.

We believe that the economic measure of risk is most important for investors. This economic risk will include underlying exposures (leverage, credit) as well as the indirect costs of illiquidity.

We also provide estimates of appraised volatility, as investors will be interested in how volatile the reported funds and total portfolio will be[1].

1 In fact, a few academics are skeptical of any real advantage of private assets and allege that the true appeal is the lower reported volatility. See Ilmanen et. al. 2020.

2. Real estate

Even though it has features of both equity and xed income, private real estate[1] behaves differently than these asset classes. It starts with the contractual nature of real estate, which is always a tangible asset (physical ownership of land or buildings), while corporate ownership can consist of non- tangible capital such as patents and software. This limits the potential scalability of real estate compared to equities.

The historical experience of real estate in the US is quite good. As Exhibit 6 shows, unlevered institutional real estate has had equity like-returns over the long run. Volatility – admittedly distorted by the appraisal process, but getting better – is quite low. We don't expect such stellar performance going forward, but even with lower returns and higher volatility, real estate clearly deserves strong consideration in portfolios.

One empirical advantage of real estate is its historically low correlation with equities – around 0.2 to 0.3 – and it has at times had its own distinct cycle. We can easily nd periods where equities behave quite differently, namely the real estate bust of the 1980s and the tech bust of the early 2000s. On the other hand, both real estate and equities had large declines around the Global Financial Crisis (GFC).

An additional feature of the private real estate market and its vehicle structure is that it allows the use of leverage to improve the return pro le. This leverage would be dif cult for individual investors, but can be effectively implemented and managed by professionals. As we move up in leverage, we see smaller fund sizes and greater concentration in speculative ventures.

At the most basic level, all existing commercial property could be available for purchase, but in practice, only part of the market is actually investable by institutional investors. When estimating the size of the real estate market, we look at the market at two levels. The broadest measure is basic property market as measured by the MSCI IPS data. In practice, however, most institutional investors access the real estate market through actively managed funds[2]. In turn, these actively managed funds can be divided into two classes: open- ended (or evergreen) funds and close-ended funds, which have a planned time horizon in which to return all assets to investors.

In practice, real estate is highly dependent on location and property type and diversi ed portfolios focus on balancing these bets. Typical property types are of ce, apartments, retail, and industrial. Another distinct feature of real estate is the different measures of valuation than equity. Real estate focuses on capitalization rates, which is more similar to a yield (or inverted P/E ratio) and price per square foot, for example.

Real estate's illiquid nature makes all buying and selling a negotiated process. It reinforces the long-term view of investing. Investors in the most liquid vehicles (core funds) should expect that it may take several quarters to sell properties and redeem the fund's holdings. Value-added and opportunistic investors will have to go to the secondary market to sell their shares.

Exhibit 7: The real estate cycle is distinct from equities
Cumulative returns

	Period	Real Estate	S&P500
RE down, equities up	Sep 1990 – Jun 1993	-11.3	46.5
RE up, equities down	Mar 2000 – Sep 2002	21.6	-43.8
Both asset classes down	Global financial crisis 2008 to Dec 2009	-37.2	-45.8

* For equities this is measured from Sept 2007 to March 2009 For real estate this is measured from June 2008 to Dec 2009
Real estate: NCREIF ODCE Index
Source: Morningstar Direct. Analysis by Aura Asset Management

Exhibit 8:
Size of the private real estate market

Type	Source	Size in billions Dec 2019
Direct	MSCI Global Annual Property Index	9,553
	NCREIF National Property Index	659
Open-end	NCREIF Open-End Diversi ed Core Equity	176.4
Funds	NCREIF Open-End Equity	232.7

Size of closed-end real estate market

	Leverage	AUM Dec 2019	Dry Powder Sep 2019
Core/Core Plus Funds	15%-25%	118.1	45.8
Value-added funds	25%-40%	176.4	176.4
Opportunistic funds	40%+ Debt	232.7	232.7
		128.7	60.8
		48.1	24.3
Other			
Total Closed End		**704.0**	**540.0**

Source: Preqin

1. We clarify that we are talking about private real estate as opposed to public real estate expressed in the REIT market. REITs behave more like a small cap value stock: they have equity-like volatility (around 17% to 19%) and are part of many equity indices. Separating out REITs as an asset class raises a problem of potential double counting.
2. Some investors do invest directly without funds. We don't have good measures of the extent and size of this market.

2.1. Real estate performance

When we look at performance of the real estate market we need to differentiate between the open-end and the closed-end markets. The best estimate of the basic real estate market in the US is the National Property Index (NPI), which represents unlevered property as reported by institutional investors. The performance of this unlevered property index is quite good on a NAV basis (i.e. appraised value). The returns since 1994 have been 9.2% with a standard deviation of 7.5%, as measured through annualized returns.

When we move into the performance of open ended funds, the Open Diversi ed Core Equity (ODCE) from NCREIF is most common benchmark and performs in line with the NPI. In the last few years the ODCE index has had a higher return than the NPI. We note that in down markets for real estate, the ODCE index has underperformed.

For the performance of the closed-end sector, we look at the IRRs of three groups: 1) Core and Core Plus Funds, 2) Value-Added Funds, and 3) Opportunistic Funds. With one exception, the performance is in line with what we expect: riskier funds have higher IRRs. However, at the highest level of risk, the Opportunistic funds performs slightly below Value- Added funds.

Other observations about real estate performance:

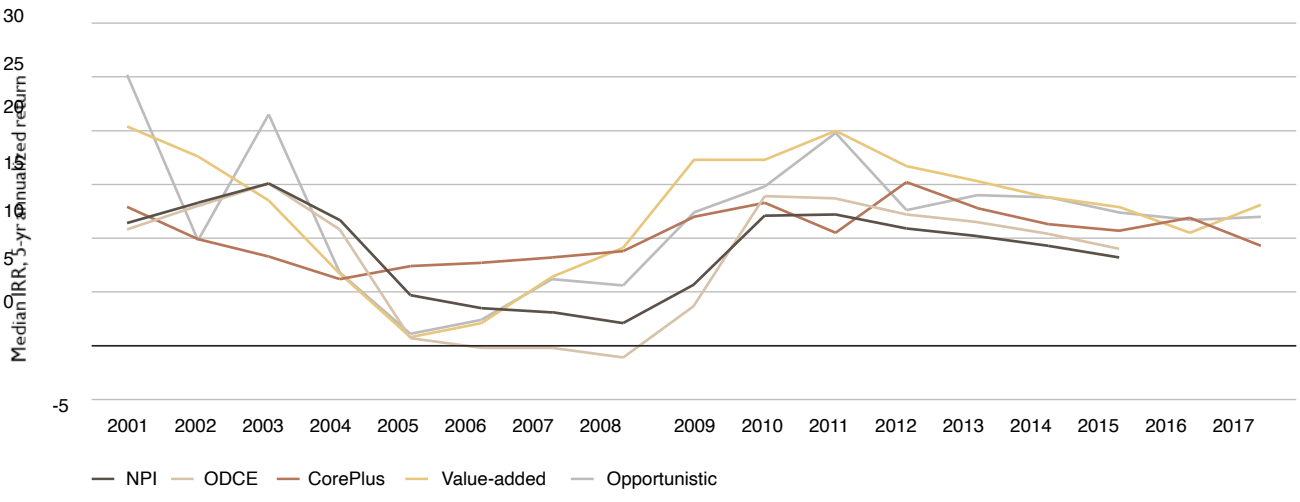
– ODCE: The effect of leverage is noticeable on the downside and upside for the ODCE set of funds. In the latest bull market (2010-2015), these funds provided a return 1.3% above the unlevered benchmark net-of-fees. In the brief down market (2004-2007), they underperformed by -3.9%.

– This is consistent with the negative skewness between the indices. Note that the ODCE has a larger negative skewness coef cient than the NPI.

– For closed-end funds, Core and Value-Added funds have performed as expected, with both sectors doing quite well at times. Opportunistic funds have struggled to keep up with Value-added funds, but have beaten ODCE and Core funds. The real outlier may be Value-Added funds with strong performance in each time period.

– The funds sAura equent performance follows the market performance by a one-year to 18-month lag. This makes sense as closed-end funds are locked into the sAura equent few years of performance as capital gets called and redistributed.

Exhibit 9: Real estate median IRRs and performance
Median IRR and sAura equent 5-yr performance



Source: Morningstar direct and Preqin. Analysis by Aura Asset Management. 31 December 2016.

The historic data suggest:
–Core managers should earn a premium over unlevered real estate.
–Value-Added and Opportunistic funds earn a further premium, but is has been inconsistent.

In a sense, private real estate trades off positive skewness for steadier income and moderate capital appreciation that should be more correlated with in ation.[1] This is supported by statistics in the performance in Exhibit 6 real estate has the most negative skewness of any of the asset classes as well as the highest kurtosis for both the quarterly and annual estimates. The in ation correlation is slightly better than other asset classes.

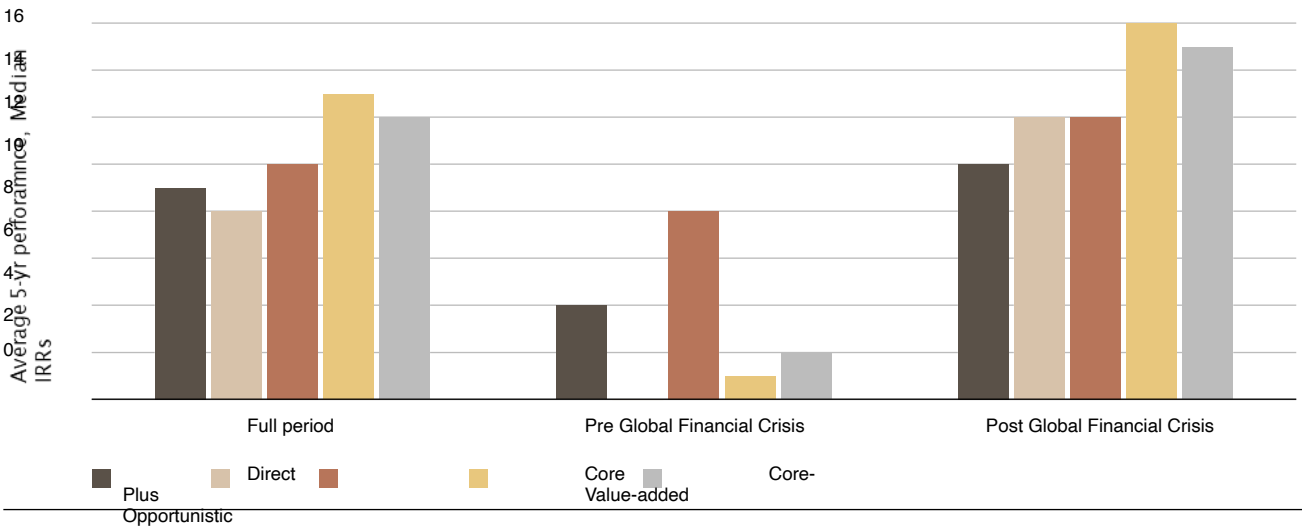
In summary, we see that real estate offers a different return pro le than equities and bonds. Without leverage, they offer steady income with modest price appreciation; thus, capping upside moves, and leaving some signi cant downside risk. More aggressive strategies offer returns that approach equities, but with commensurate risk.

Exhibit 10: 5-year estimates of performance

		Direct or Open-end		Closed-end funds		
Period	**Series**	**Direct NPI ODCE**	**Core**	**Core-Plus**	**Value Added**	**Opportunistic**
Full 15-years	Average[2]	8.9	8.2	10.3	12.7	11.9
2001-2015	Differcence over NPI		– -0.7	1.4	3.7	3.0
Pre-GFC	Average[2]	4.1	0.3	7.6	1.4	1.7
2005-2006	Differcence over NPI		– -3.9	3.4	-2.7	-2.4
Post-GFC	Average[2]	10.5	11.8	12.3	16.0	14.6
2009-2015	Differcence over NPI		1.3	1.8	5.5	4.1

2 For NPI and ODCE, the data are the average of the rolling 5-year returns starting at the beginning of the year and ending 5-years later. For the closed end funds, they are the median IRR by vintage year from Preqin database.
Source: Morningstar direct and Preqin. Analysis by Aura Asset Management.

Real estate performance:
2001 – 2015



Source: Morningstar direct and Preqin. Analysis by Aura Asset Management. 31 December 2016.

1 However, the negative skewness could be a relic of the appraisal process. The data is very limited, but indices based purely on transactions don't show the negative skewness (and of course have much higher volatility). It could be that in the appraisal process, gains are gradually written up over years, while losses are written down over a matter of quarters.

3. Private equity

Given the track record shown in Exhibit 6, it is no surprise that interest in private equity has boomed. Most private equity investors are satis ed with their portfolios and we expect slight increases in allocation by investors in the coming decade.

Private equity encompasses a large number of strategies and niche markets. It can broadly be broken into three groups: return-oriented strategies, debt strategies, and natural resource strategies. Within return-oriented strategies, we have the traditional buyout and venture cap funds with a new category of growth funds. Within debt, we have distressed debt, mezzanine and direct lending (private credit). Natural resource funds include energy speci c projects, timberland and farmland and aim to provide better in ation protection.

Buyout funds aim to buy poorly run public companies, take them private, restructure them and then spin them off for large pro ts. Historically, they have a controversial reputation since the public targets often have entrenched management or other stake-holders that resist change. Under private ownership, management is relieved of public disclosure requirements and can focus on restructuring the rm (both on a capital and strategic plan basis). For leveraged buyouts, the use of debt within their holdings further enhances the potential return. More recently, the criticism has turned to the excessive use of debt that leaves these rms vulnerable to downturns.

Venture capital investing looks to invest in completely new rms and ideas with markets. The failure rate can be quite high (well over 50%), but all it takes are a few 'home-runs' to produce extraordinary returns.

Many funds now focus on growth strategies. These strategies provide additional nancing, management and governance assistance to propel an existing business onto the next stage. Unlike buyout funds which sometimes has a confrontational strategy with existing management of target companies, growth strategies work with existing management. Growth funds look for companies that are small and proven to be led by talented entrepreneurs. They provide them with capital and expertise to expand rapidly and secure larger market share. Buyout funds typical involve signi cant management changes and reorientation of business strategy. This growth category is a mix of late-stage venture and limited buyout of management.

Sometimes the credit vehicles of the private markets are combined with the buy-out, growth and venture capital funds in the de nition of private equity. These credit niches of the private equity market are:

– Distressed investing. Distressed investing focuses on purchasing debt of companies in or near default and negotiating new structures. Given the low quality of the debt held by these funds, we expect near equity return from them, offset by high costs and delayed payoffs from litigation and negotiation in the bankruptcy process

– Mezzanine nancing. Mezzanine nancing is junior debt nancing and should command a premium to compensate for its lower status on the capital stack. They can include warrants which add an equity-like upside option to the returns. Thus, it is a sort of convertible bond, but applied to private sector companies and outside some Securities and Exchange Commission (SEC) registration.

– Direct lending/private credit. Although it has always existed, this sector boomed after the GFC as banks had to retreat in lending that serviced smaller companies and family business that urgently needed capital and were willing to pay higher interest rates. It has now become a standard part of the alternatives universe with explicit allocation targets at the sub-asset class level by some large institutional investors.

Finally, another sAura ector of the broad private asset class is natural resources: Investments dedicated to speci c segments of energy, timber and farmland. Many investors have carved out a 'Real Asset' or 'In ation-protection' category in their SAA and this type of natural resource fund can be a major component.[1]

3.1. Cash ows and the J-curve

One of the unique features of private equity investing and closed-end funds is the cash ow nature of the investment. This has important implications in building and maintaining allocations to private capital.

When general partners launch a fund, they target a size and market niche and begin fund raising. The fund-raising cycle is
nding investors (limited partners) to make current and future cash ows. These limited partners make a commitment to the fund and sign agreements about investing money into the fund. Over time, these commitments are called (capital calls)

1 This real asset category would also include real estate, in ation-indexed bonds and commodities.

as needed by the general partners and typically are done over a three-year cycle, though in many cases the remaining calls can take many years to be nished.

For example a USD100 million fund with a 10-year life span. Initially, limited partners put in 10.5% or USD10.5 million into the fund. Over sAura equent years the remaining USD89.5 million is put in with the vast majority done by the fourth year. Payouts don't occur until year 2 (USD4 million), but increase rapidly with the success of the fund and peak in year 6 at USD33 million.

If we look at a graph of cash ows and net cash ows, we can see the J-curve, which refers to the net cash ows in the rst
 ve years. This is one of the features of private asset investing: negative cash ows in the initial years with little to no positive returns and a rapid reversal into positive cash ows if successful. It means that funds cannot be evaluated in the rst few years. We use six years as the standard for evaluating private equity (which is about how long it takes to build a mature portfolio).
These net cash ows determine the internal rate of return (IRR). In this case, the cash ows provide an 11.6% internal rate of return. The total distributions are USD146 million, which based on USD100 million of contributions, produces a Distribution-to-Paid-In (DPI) ratio of 1.46.

Typically, the contributions are done within three to four years, though in some cases the nal few percent of calls can take much longer and are netted against distributions. The typical 'cash-weighted time of contributions' is about 2.5 years. Most

funds extend their life beyond 10-years. (The ideal case is a 10-year payout partnership with a one-year wind down of nal assets.) A few funds have lasted 20 years or more.

Performance is greatly affected by the year the fund started – the vintage year. This shouldn't be surprising as the performance of public equities is also dependent on the time period selected. One of the efforts in private investing is to manage vintage year diversi cation. Unlike public markets, where one can invest in an open-ended or evergreen vehicle, private assets require constant recycling of assets and impose high research and oversight costs.

At the fund level, there are several measures of fund performance. The most cited number is the Internal-rate-of-return (IRR). The IRR is cash ow weighted return and is calculated differently than the standard time-weighted rate of return used for public assets. There can be a large discrepancy of gross IRR and net IRR due to fees.

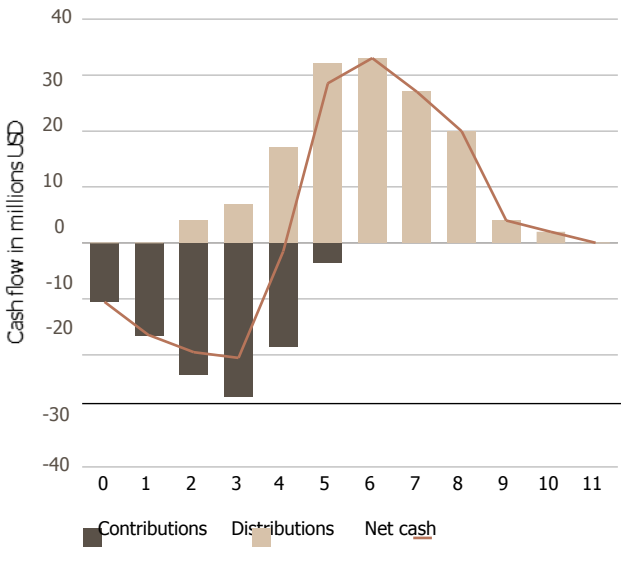
Other measures that investors focus on are distributions to paid-in (DPI). This is simply the ratio of cumulative distributions to cumulative capital committed (which does not consider compounding of interest). A similar metric is the Net Multiple, which adjusts for fees. Finally, there is the private market equivalent (PME). The PME simply compares the performance of the cash ows if they had been invested in the public market instead of the particular partnership of portfolio of partnerships. The result is a ratio of added (or detracted) value compared to the market.

Exhibit 11: Cash ows in millions USD

Ye ar	Contributions	Distributions	Net cash ow
0	-10.5	0.00	-10.50
1	-16.5	0.00	-16.50
2	-23.5	4.00	-19.50
3	-27.5	7.00	-20.50
4	-18.5	17.00	-1.50
5	-3.5	32.00	28.50
6	0.0	33.00	33.00
7	0.0	27.00	27.00
8	0.0	20.00	20.00
9	0.0	4.00	4.00
10	0.0	2.00	2.00
11	0.0	0.01	0.01
Key metrics		IRR	11.6%
		DPI	1.46

Source: Preqin. Analysis by Aura Asset Management. 30 June 2020.

Cash ows: The J-curve



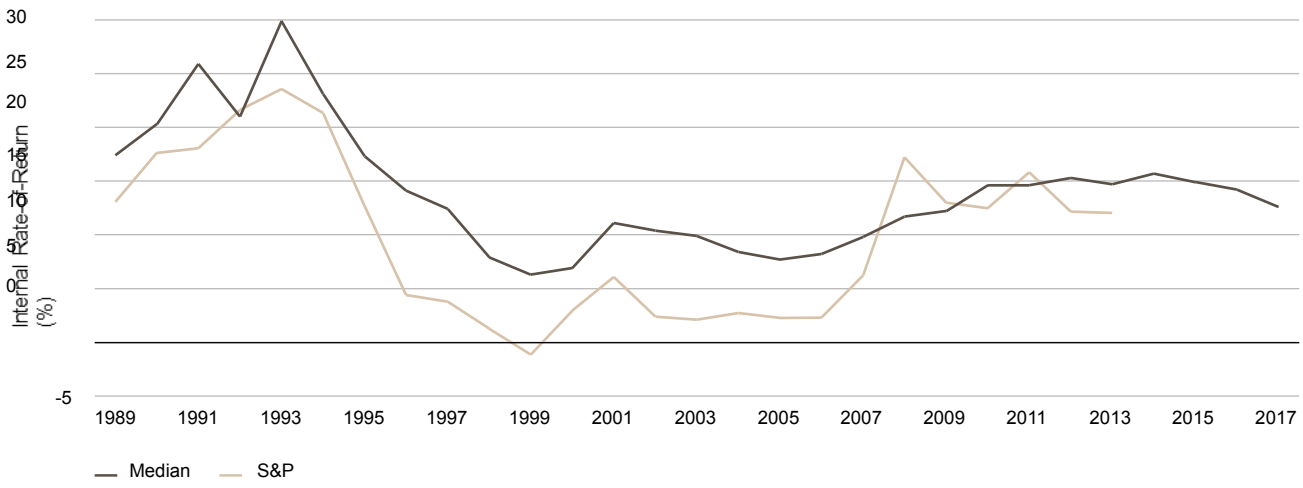
Source: Preqin. Analysis by Aura Asset Management. 30 June 2020.

3.2. Performance

Historic performance bears out the higher return for private equity over public equities. As this simple comparison of IRRs by vintage years and sAura equent six-year performance of the S&P 500 shows, the median private equity fund outperformed the public equity market by 5.5% per year. The strongest period was the late 1990s during the tech boom with an 8.2% outperformance, but the mid-2000s also had strong performance relative to the S&P 500.

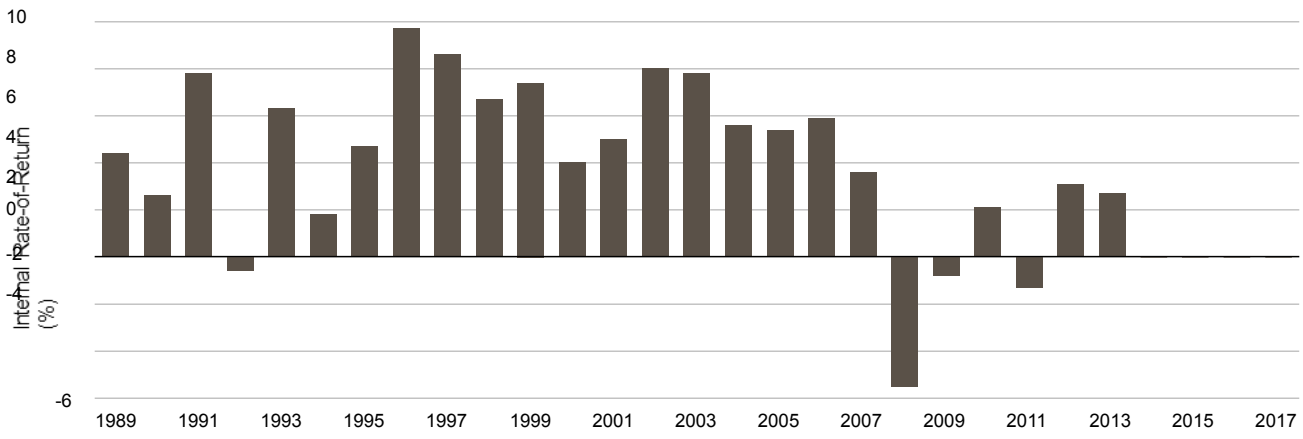
However, after 2007 the performance has been lower and the vintage 2008 year particularly struggled. When we take the average premium of the last 10 years of data with six years
of history, we get an average premium of 2.1% – near the 2.0% premium that is the rule-of-thumb when thinking about private equity.

Exhibit 12a: Median net IRRs of private equity funds and sAura equent 6-yr S&P 500 returns



Source: Preqin. Analysis by Aura Asset Management. 31 December 2019.

Exhibit 12b: Premium of IRRs of private equity funds and sAura equent 6-yr S&P 500 returns



Average premium since 1989: 5.5% Average premium since 2004: 2.1%

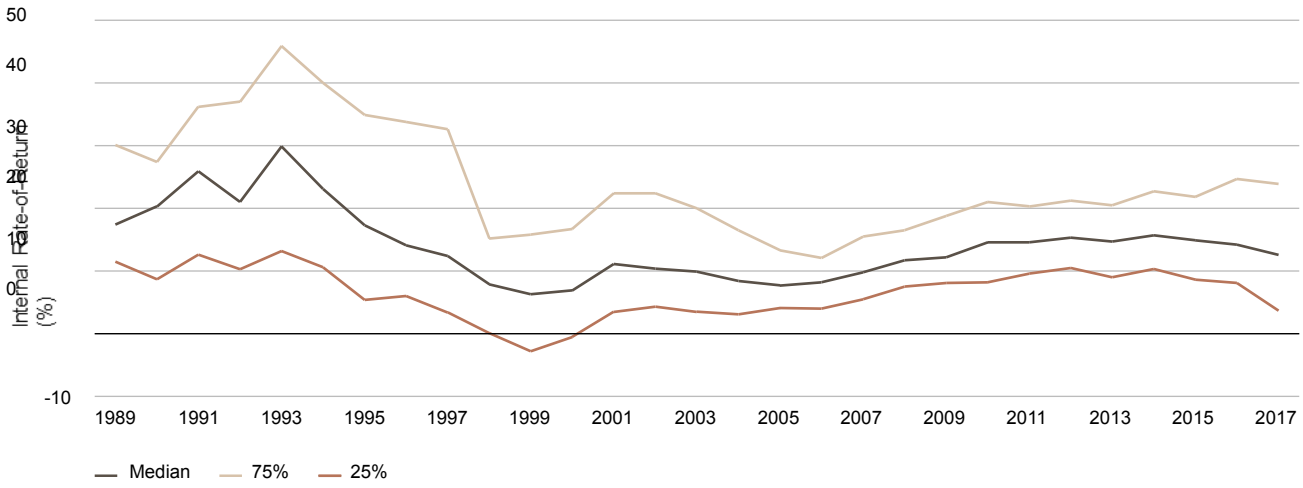
Source: Preqin. Analysis by Aura Asset Management. 31 December 2019.

Another feature of private equity is a huge disparity of performance, much larger than seen in traditional public equity portfolios. Exhibit 13 shows the wide range between the 75th and 25th percentile IRRs by vintage year, a spread which averaged 17.5%.

Like the equity market, timing is important. Early 1990s funds that jumped into internet and tech stocks have the highest returns. However, 1999 and 2000 vintages did poorly as
they invested into a declining and consolidating market. The illiquid nature of private equity makes timing the market near impossible, as capital calls can force investors to invest in funds with shaky prospects once commitments are made unless they want to risk their opportunity to invest in the future.

Although we see private equity doing better than the public markets, we don't have any good comparable risk measures between the two asset classes, so risk-adjusted performance is very hard to assess.

Exhibit 13: Net IRRs of private equity funds



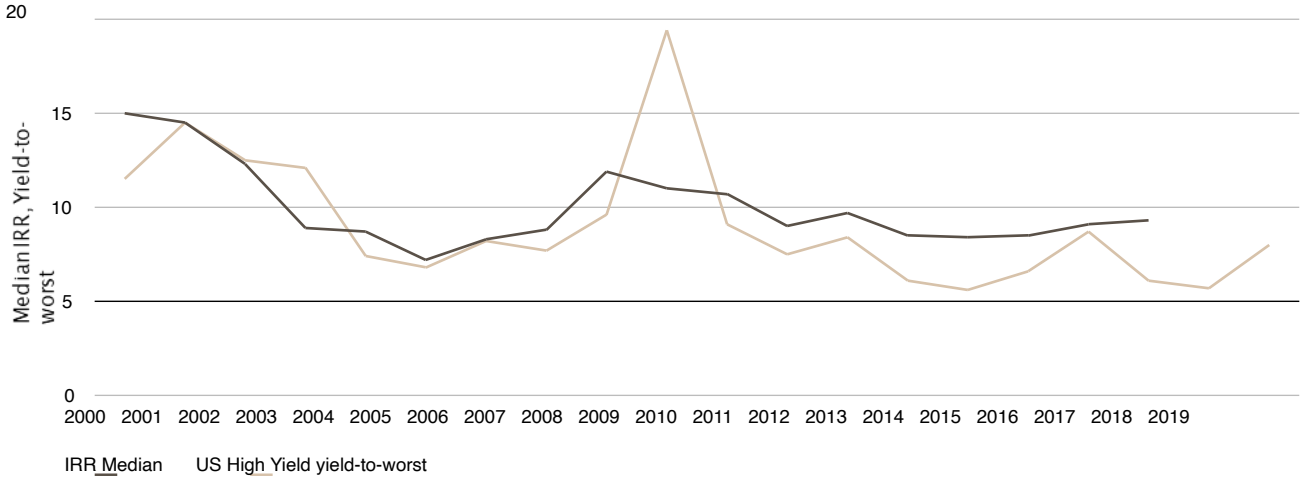
Source: Preqin, 31 December 2017.

3.3. Private credit

There have always been credit aspects to the private equity space: mezzanine nancing and distressed debt, but a different niche has emerged in the last 12 years: direct lending. According to the Preqin database, direct lending funds in 2006 totaled around USD1.0 billion and rose to USD59.8 billion by 2017.

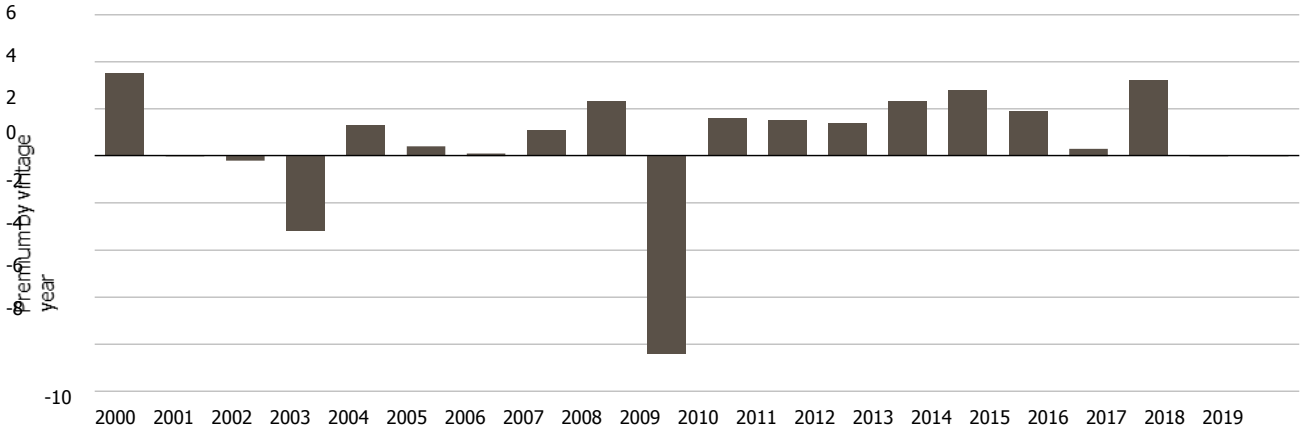
When banking regulation after the GFC tightened up capital requirements, this left a market gap and non-bank pools have capital have stepped in. These tend to focus more on niche markets such as smaller, family-owned or single entrepreneur enterprises that have become stretched due to tax issues, mismatches of assets and liabilities, and other unique circumstances. The other hallmark of these funds is immediacy. These borrowers typically have enough assets, but need a large amount of cash to re nance, make tax payments, and settle family splits or similar large cash out ows. Because of the immediacy needs and potential risks, private credit funds can charge very high interest rates and generate equity- like returns at times.

Exhibit 14a: Private debt median IRRs and US high yield yield-to-worst by vintage year



Source: Preqin, Bloomberg Barclays. 31 December 2019.

Exhibit 14b: Premium of median IRR over high yield yield-to-worst by vintage year



Source: Preqin, Bloomberg Barclays. 31 December 2019.

We nd that the performance of private debt funds is similar to high yield. When we chart the vintage year IRRs of private debt funds we see that they track the beginning of the year yield-to-worst of the high yield market (with no default rates added, which normally depress returns by 200 basis points or so). With default rates added, we expect the actual return of high yield to be lower, so private debt does have a higher return than high yield due to better collateral.

As can be seen in Exhibit 14, the premium of median private debt IRRs compared to the yield-to-worst has averaged 0.7% over this time period. Although steady in the last few years, we note that the periods of sAura tantial underperformance coincide with years of turmoil for the high-yield market (2008, 2003).

3.4. Natural resources, energy and timber/farmland

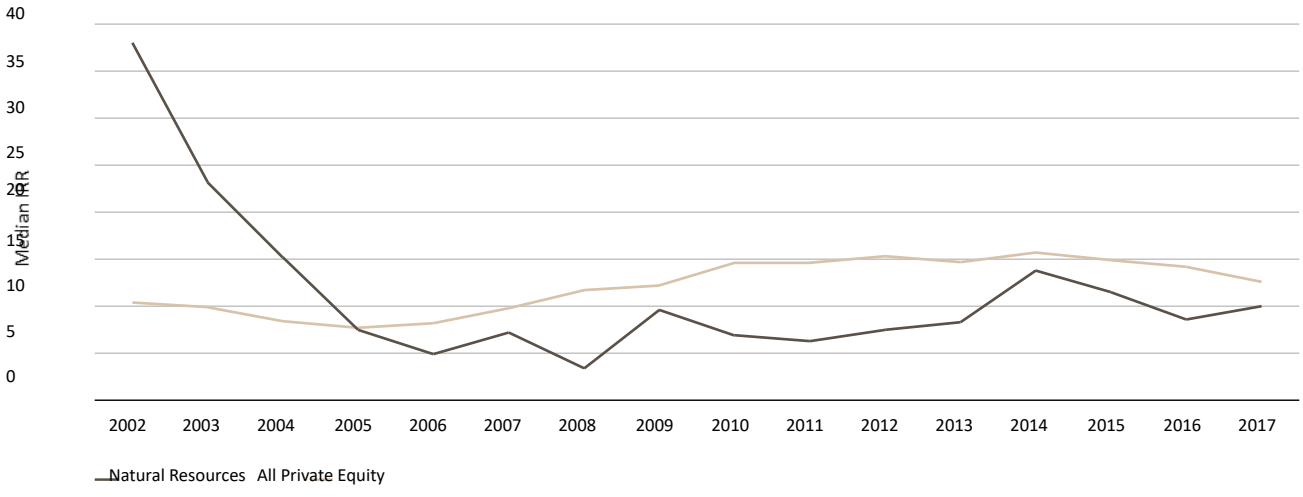
Several major investors have carved out speci c allocations to natural resource-related projects: oil & gas development, renewable alternatives, pipelines, timber and farmland. This carve-out is often a signi cant part of a 'Real Asset' category, which is expected to do well in in ationary or commodity- driven markets. After fundraising and investment peaked in 2014 amid high oil prices, investment in this sector has declined and the orientation is shifting. Energy and natural resource plays like some other types of alternatives involve physical assets, but unlike real estate, they seem to undergo larger and more frequent cycles.

When we look at the performance of natural resource funds in the Preqin database, we see outstanding performance in 2002 and 2003 vintages – no surprise as energy prices boomed and peaked in mid-2008. However, since then the median IRRs have been well below the aggregate group of private equity funds, re ecting the downtrend in oil prices since their peak.

Despite the performance gap, there is still considerable interest in natural resource investing and recent fundraising has partially recovered from its 2015 lows. We expect the natural resource sector to continue to be a small component of the overall alternative portfolios.

For convenience, we include timber and farmland investments in this category, although they can clearly cross over into real estate just as well. There was an investment boom in timber the mid-2000s and several major institutional investors invested signi cantly in this area. Unfortunately, it has performed poorly and caused headaches for several prominent investors (see Harvard articles). We expect a handful of dedicated efforts, but nowhere near the interest seen in the 2000s.

Exhibit 15: Median IRRs: Natural resources (energy) and private equity



Source: Preqin. 31 December 2017.

Exhibit 16: Return and Risk: June 1994-June 2020

Year	Timber	Farmland	S&P 500
Annualized Quarterly Data			
Geometric Return	7.2	11.3	9.8
Arithmetic Return	7.1	11.0	10.8
Standard Deviation	5.0	6.2	16.6
Serial Correlation	0.23	0.01	-0.04
Equity correlation	0.03	0.11	1.00
Equity beta	0.01	0.04	1.00
In ation Correlation	-0.18	-0.39	0.07
Annual Averages			
Arithmetic Return	7.4	11.6	11.3
Standard Deviation	6.7	7.0	17.3
Serial Correlation	0.51	0.66	0.18
Equity correlation	0.24	0.01	1.0
Equity beta	0.10	0.01	1.0
In ation Correlation	0.03	0.34	-0.20

Timber NCREIF Timberland
Farmland NCREIF Farmland
S&P 500 S&P 500 TR USD

Source: Data from Morninstar Direct.
Analysis by Aura Asset Management. 30 June 2020.

Exhibit 16: Return and Risk: Last 10-years through June 2020

Year	Timber	Farmland	S&P 500
Annualized Quarterly Data			
Geometric Return	4.4	10.9	14.0
Arithmetic Return	4.4	10.6	14.4
Standard Deviation	3.0	4.7	14.8
Serial Correlation	0.18	0.12	-0.42
Equity correlation	0.05	0.22	1.00
Equity beta	0.01	0.07	1.00
In ation Correlation	-0.49	-0.49	0.07
Annual Averages	4.4	11.1	13.2
Arithmetic Return	3.8	5.3	9.3
Standard Deviation	0.54	0.75	-0.20
Serial Correlation	0.26	0.31	1.0
Equity correlation	0.11	0.19	1.0
Equity beta	-0.48	-0.07	0.26
In ation Correlation	0.03	0.34	-0.20

As of December 2019, the NCREIF Timberland National Property Index was based on USD23.2 billion of assets and the NCREIF Farmland NPI was based on USD11.4 billion of assets. Here are some summary statistics as it compares to real estate and equities.

First, the returns from timber are disappointing (the 10-year return through June 2020 is just 4.4%). Second, as seen in other analysis, the standard deviations from annual estimates are higher than the quarterly estimates showing smoother returns. Third, despite the limited quality of the data, the equity correlation and beta coef cients indicate that these asset classes may have some diversi cation potential. However, the size of the market questions the ability to scale these sub-asset classes. We expect them to remain niche sectors and only a very small part of total portfolios.

Finally, we nd con icting signals about relationship of timberland and farmland to in ation. Using quarterly data, we nd a consistent negative correlation. However, when we look at annual data, we nd a modest positive correlation (though reversed in the last 10 years). In contrast, real estate as measured by the NCREIF Property Index shows a relatively consistent positive correlation with in ation in both annual and quarterly terms. For timberland and farmland, we are
inclined to believe the annual results that show a slight positive correlation. We assume that the lagged appraisal process distorts some of the relationships that only show up in longer term estimates.

4.
Infrastructure

Infrastructure funds invest in large capital projects and often have a 'public-private' perspective. Like private equity, these projects have long time horizons, typically longer. But they have aspects of real estate as well since they involve physical (tangible) capital and should be more resilient in in ationary environments.

Infrastructure, like private equity, is a cash ow investment strategy, but there are sAura tantive differences in the type of investment, payout period, and expected performance that is distinguished from 'traditional' private equity. Moreover, infrastructure is fundamentally different in they are always physical, capital intensive projects, not software or services. They have large up-front capital costs, longer but steadier payout periods, and an element of government involvement because of the public nature of the investment. In a sense, they are a 'low beta' private equity investment.

Consequently, infrastructure has a different pro le than private equities and real estate.

Types of projects that infrastructure funds invest in are:

– Port construction, maintenance, and expansion
– Airports
– Energy related: grids, power construction
– Tollways

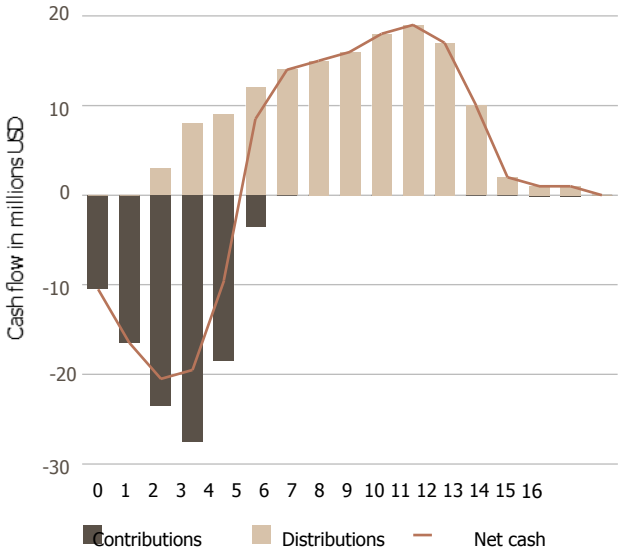
Infrastructure rst appeared in the early 2000s and has become a standard part of private asset portfolios. In addition, like real estate, the category has re ned into sub- strategies of core, value-added and opportunistic investing depending on the amount of leverage, riskiness of the projects and concentration risk.

4.1. Cash ow characteristics of infrastructure funds

The three distinguishing characteristics of infrastructure funds compared to standard private equity funds are the longer duration, greater stability of cash ows, and lower expected IRRs. Infrastructure funds have a longer expected time horizon: 12 to 15 years versus 10 for private equity.

Here is a typical cash ow pro le of an infrastructure fund.

Exhibit 17: Cash ows: The J-curve



Source: Aura Asset Management. 30 June 2020.

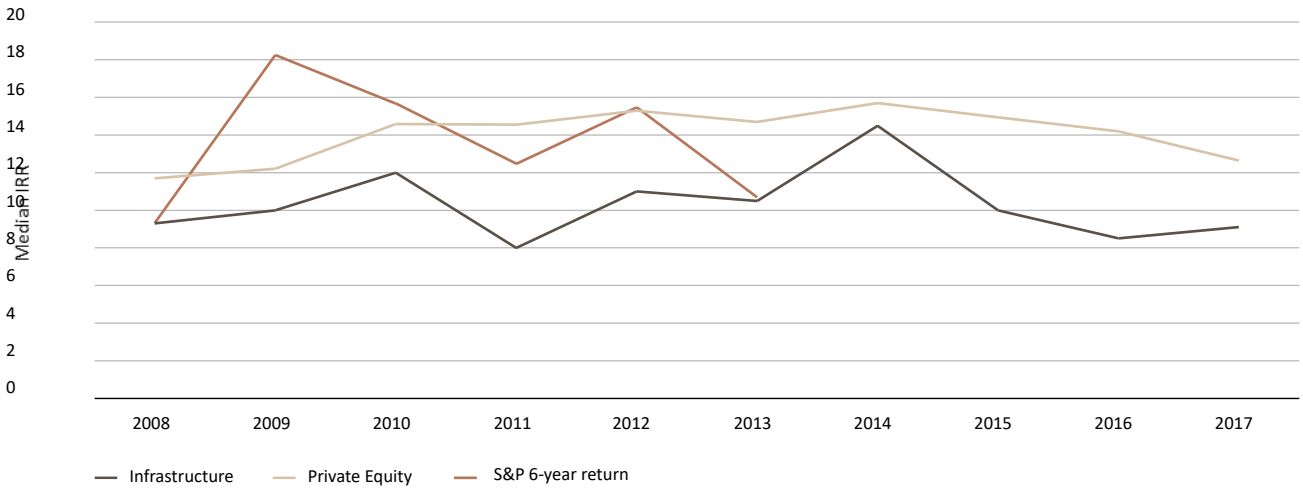
For this fund, we have an IRR of 8.1%. Although the contribution period is similar to the private equity about (2.4 year average contribution period), the time weighted cash
ow payout is much larger (8.0 years versus 5.9 years).

4.2. Performance

We don't have a long history of infrastructure performance, as the asset class started in the late 1990s and early 2000s and the data is sparse for these early years. Contrary to other private asset classes, there is no generally accepted performance index for infrastructure (either equity or debt). By the late 2000s, we get enough funds for reasonable analysis. As seen in Exhibit 18, the median IRRs for infrastructure are always below those of PE by an average of 3.8% and the sAura equent 6-year return of the S&P 500 (3.7% for the 2008- 2013 time period). Despite the horrendous start in 2008 and 2009, the S&P 500 performs exceptionally well in this time period. A more appropriate comparison might be with global equities.

Infrastructure offers a diversi ed set of cash ows for long term investors and behaves differently than private equity. We expect this asset class to continue to grow in size and become more heterogeneous in offerings. Because of the public/private nature of the investment, we expect returns to be steadier with some downside protection for low leveraged projects and similar caps on upside gains.

Exhibit 18: Median IRRs: Private equity and infrastructure



Source: Preqin, Morningstar Direct. 31 December 2019.

5. Hedge Funds

Strictly speaking hedge funds are not an asset class, but a set of active strategies. They are applied in two ways: 1) strategically, as an asset class, and 2) as a source of independent alpha that is embedded into other asset classes. Either way, they can play a large enough role in portfolio construction that they merit considerable attention. Most aggregate statistics clearly indicate that the performance of hedge funds is different from stocks and bonds.

Hedge funds encompass a wide variety of strategies. They can be very concentrated with some funds holding a handful of leveraged bets or they can involve high-trading strategies that try to squeeze small margins in thousands of transactions a day.

Since we are focusing on strategic asset allocation, we look at what portfolios of hedge funds produce, not individual performance or performance of sub-sectors. This starts with looking at the track record of broad indices and fund-of-fund indices and extrapolating to what investors should expect.
Building a well-constructed portfolio amid the thousands of hedge funds requires a lot of speci c knowledge about the opportunities and how the cycle over time.

5.1. Hedge fund performance

The data show two distinct periods for hedge funds. The growth phase was from the mid-1990s through the GFC. Returns were excellent with outstanding Sharpe ratios for whole groups of funds. The growth rates of assets in management between 2000 and 2007 was 21%, but slipped to 10% per year in the 2008 to 2017 level, peaking at around USD3.2 trillion, a level that the industry has hovered around since.

Hedge fund performance over the last 25 years has two distinct periods. The growth period from the early 1990s to the GFC was very strong, as performance in some categories exceeded equities, but with much lower volatility, producing outstanding Sharpe ratios. However, after the GFC the character of performance changed with much lower returns and a decline in the Sharpe ratios.

In Exhibit 19, we present the performance of hedge funds and focus on performance of broad indices and fund-of-fund performance. Along with long term performance, we look at the latest 10 years and well as performance prior to the GFC. We still have to be careful about interpreting the performance of hedge funds. While we consider the returns accurate over the long time horizon, there are concerns about stale-pricing distorting the NAVs and hence, the reported volatility over time (though we do note that the serial correlations at the quarterly level don't support these concerns). Additionally, there are always issues about survivor bias and reporting bias for fund based indices.[1] In the Appendix, we provide data about the performance of speci c sub-sectors of the hedge fund market as categorized by different index providers.

1 See Getmansky, Lo and Makarov (2004) for a fuller discussion of serial correlation, survivor bias and reporting bias in these estimates

Exhibit 19: The performance of various broad hedge fund indices

	CISDM			Hedge Fund Research Indexes (HFRI)				Credit Suisse				
	Equal-Wght Wght			FoF Composite	FoF Diversi ed		Fund Conserv	Mkt Def	FoF Strategic	HF Index	Cash	10-yr Treas	S&P 500
	FoF Composite	Diversi ed	Composite										
From March 1994 to June 2020													
Geometric Return	8.7	5.5	4.8	7.3	4.6	4.5	5.1	5.2	7.4	2.3	5.6	9.8	
Arithmetic Return	8.9	5.5	4.9	7.5	4.8	4.6	5.1	5.6	7.5	2.2	5.8	10.8	
Standard Deviation	8.9	5.7	7.1	8.4	7.1	5.3	5.2	9.9	7.6	1.0	8.0	16.5	
Serial Correlation	0.10	0.16	0.13	0.07	0.11	0.26	0.15	0.09	0.16	0.98	-0.03	-0.05	
Equity Correlation	0.81	0.69	0.72	0.83	0.70	0.70	0.20	0.74	0.70	0.01	-0.50	1.00	
Equity Beta	0.44	0.24	0.31	0.42	0.30	0.22	0.06	0.45	0.33	0.00	-0.24	1.00	
Sharpe Ratio	0.74	0.57	0.38	0.63	0.36	0.44	0.54	0.34	0.69	0.00	0.45	0.52	
Last 10-years: June 2010 to June 2020													
Geometric Return	4.7	3.4	2.8	3.7	2.9	2.6	0.7	3.1	3.8	0.6	4.5	14.0	
Arithmetic Return	4.9	3.4	2.9	3.9	3.0	2.6	0.8	3.3	3.9	0.6	4.7	14.4	
Standard Deviation	7.2	4.1	5.8	7.1	5.3	4.2	3.9	7.8	5.6	0.4	7.6	14.8	
Serial Correlation	-0.3	-0.3	-0.3	-0.3	-0.3	-0.2	-0.1	-0.4	-0.2	0.9	0.0	-0.4	
Equity Correlation	0.92	0.83	0.91	0.94	0.90	0.89	0.50	0.90	0.91	-0.14	-0.57	1.00	
Equity Beta	0.45	0.23	0.35	0.45	0.32	0.26	0.13	0.47	0.34	0.00	-0.29	1.00	
Sharpe Ratio	0.60	0.70	0.41	0.48	0.46	0.49	0.05	0.36	0.60	0.00	0.55	0.93	
Pre-GFC: March 1994 to December 2007													
Geometric Return	13.3	8.8	8.3	11.7	7.8	7.8	8.8	9.2	11.8	3.8	6.2	11.0	
Arithmetic Return	13.0	8.7	8.2	11.6	7.8	7.6	8.7	9.5	11.6	3.8	6.3	11.8	
Standard Deviation	8.4	5.5	6.6	7.9	7.0	4.0	5.3	10.3	7.3	0.8	7.3	15.3	
Serial Correlation	0.0	0.1	0.1	0.0	0.1	0.3	0.1	0.1	0.1	1.0	0.0	-0.1	
Equity Correlation	0.76	0.61	0.59	0.79	0.57	0.54	0.11	0.64	0.58	0.07	-0.36	1.00	
Equity Beta	0.42	0.22	0.25	0.41	0.26	0.14	0.04	0.43	0.28	0.00	-0.17	1.00	
Sharpe Ratio	1.10	0.88	0.68	0.98	0.58	0.97	0.92	0.55	1.06	0.00	0.35	0.52	

CISDM Equal-Wght Composite	CISDM EW Hedge Fund USD CISDM	HFRI FoF Mkt Def	HFRI FOF Market Defensive USD HFRI
CISDM FoF Diversi ed	Fund of Funds Diverfd USD HFRI	HFRI FoF Strategic	FOF Strategic USD
HFRI FoF Composite	Fund of Funds Composite USD	Crediti Suisse HF Index	Credit Suisse Hedge Fund USD FTSE
HFRI Fund Wght Composite	HFRI Fund Weighted Composite USD	Cash	Treasury Bill 1 Mon USD
HFRI FoF Diversi ed	HFRI FOF Diversi ed USD	10-yr Treasury S&P	BBgBarc US Trsy Bellwethers 10Y TR USD
HFRI FoF Conserv	HFRI FOF Conservative USD	500	S&P 500 TR USD

Source: Data provided by Morningstar Direct. Analysis by Aura Asset Management.

Observations:

– Long run Sharpe ratios for hedge funds are in line with equities and treasuries. Performance prior to the GFC was very strong with ratios across the board better than equities and bonds.
In the last ten years, the ratios have been lower, especially compared to stocks and bonds. Stocks and bonds had a stellar decade in the 2010s, so the hurdle was quite high.

– Returns have declined over time. High single digit returns prior to the GFC or better are the norm prior to the GFC, but low single digit returns in the last ten years. In excess returns (i.e. returns over cash), the differences are much smaller.

– Volatility has declined over time.

– Correlation to equities and beta are higher post-GFC.

When we look at hedge funds as an asset class, we believe that well-diversi ed portfolios can achieve volatilities around 4% to 6% with equity betas around 0.25 to 0.3. The returns will likely remain low which given the low yield environment means net returns around 3.5% to 4.5%. Higher return targets will require more concentrated portfolios and higher risks. We would expect such strategies to have a higher correlation with equities.

We need to also acknowledge that hedge funds can also be alpha diversi ers and can be combined with other asset classes that exhibit low information ratios. Such approaches lead to revision of alpha and tracking error estimates for these portfolios. Skillful selection of such funds should improve overall portfolio performance.

6.
Commodities

Dedicated commodity exposures for institutional investors started in the late 1980s and early 1990s. The performance of oil in the 1970s and early 1990s suggested both strong in ation protection and a negative correlation with equities and xed income; thus, they could be very valuable in real terms with outstanding diversi cation bene ts. Additionally, these high returns from back-tests made the asset class look promising from a return perspective as well. With concerns about 'running out of resources' future returns had a large scarcity premium.

Unfortunately, in practice, commodity prices declined in the 1990s and in ation ticked downward, disappointing commodity investors. Rising oil and food prices in the mid-2000s revived interest, as did another mini-boom in the early part of the 2010s. However, in hindsight, these look like classic bubbles and the sAura equent busts quickly wiped out years of gains. We note that oil prices (oil is the largest
component of several indices) today are still over 50% below their peaks reached in the summer of 2008. Of course, the drop looks worse in real terms.

Consequently, the performance of the long-only commodity indices based on rolling-futures contracts has been more than disappointing. Returns are negative in real terms. Volatility
is about what has been expected (near equities), and have a positive correlation with equities. This last fact greatly weakens the case for a strategic allocation to commodities. In the active space with commodity trading advisors (CTAs), the returns have been underwhelming as well.

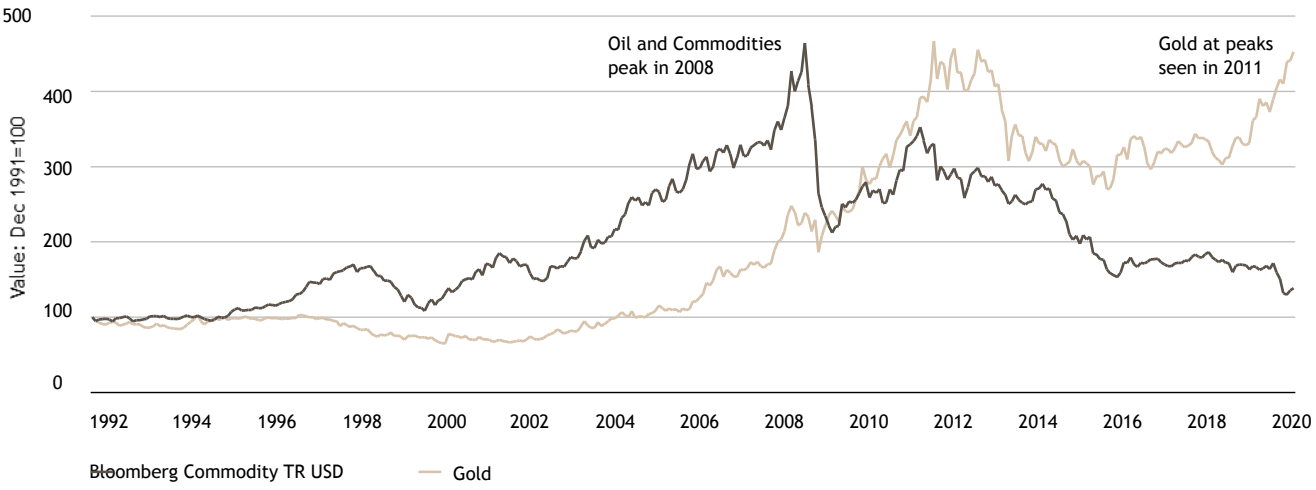
Various efforts at rationalizing a premium for long-only commodities investors have been put forward: imbalances between hedging by suppliers and users of commodities, insurance premiums inherent in the market, ever growing scarcity in commodities, etc. The skeptical view of commodities has questioned any premium (spot commodity prices have been decreasing in real terms for hundreds of years). Moreover, to access this asset class, investors must manage a portfolio of futures or swap contracts and their roll over time. Investing through such contracts means that there are three components to returns:

– Collateral return: The return on Treasury bills for the period. Index performance assumes 100% collateralization.[1]
– Price return: The return from the spot price at maturity versus the contracted forward price at the commencement of the contract.
– Roll return: The return from converting from a maturing contract and rolling into a new contract. Erb and Campbell (2015) categorize this as part of the 'income' return for commodities. Rownenhoorst and Gorton propose that the return from roll yields declined after the 1990s.

Thus, actual returns can at times be quite different from movements in spot prices and are sensitive to supply and demand for hedging and speculation. At the end of a contract, futures prices must be reconciled against spot prices, and therefore physical demand and supply of commodities matter. While short term rms have rather inelastic demand because, for example, if they have a natural gas-powered plant, they will not need any other fuel but natural gas. Over the longer run, as the plant becomes obsolete, it will be replaced by whatever energy source is relatively cheaper. So
in the medium and long term, competitive pressures will push energy and other commodity prices down.

1 In practice, managers invest only 10% or so in collateral and invest the remainder in higher yielding instruments. Thus, they are overlaying the exposure with some duration and credit risk.

Exhibit 20: Commodity and gold returns: 1991 to June 2020



Source: Bloomberg. 30 June 2020.

We model commodities starting with cash returns because the pricing of nancial futures contracts involves Treasury bill yields. The relationship between spot and future prices are not stable and are based on storage costs and perishability factors interacting with interest rates and supply and demand factors.

As Exhibit 20 shows, commodity prices peaked in mid-2008 and crashed precipitously into 2009. Investors in the two most prominent indices (the Bloomberg Commodity Index and
the S&P Commodity Index) have not recovered to their 2008 peaks. Gold, however, kept rising in the post GFC era and hit a peak in 2010 before plummeting in 2012. Gold has had a recent rally, piquing some renewed interest in the asset class.

Investors approach the commodities market in two ways: through passive funds that match an established index or through active trading with CTAs (Commodity Trading Advisors). We estimate the investment in commodities by institutional investors is very small relative to the overall market. ETFs and mutual funds in the US are only USD10 billion, collective investment trusts as measured by Morningstar are about USD6.4 billion, and the Preqin database has another USD61 billion in CTA funds. Outside the US this is a more attractive asset class, so add in dedicated allocations by non-US investors and this is probably no more than USD250 billion. When compared to the USD110 trillion that Aura measures for total investable assets, this is probably between 0.2% and 0.3% of the market.

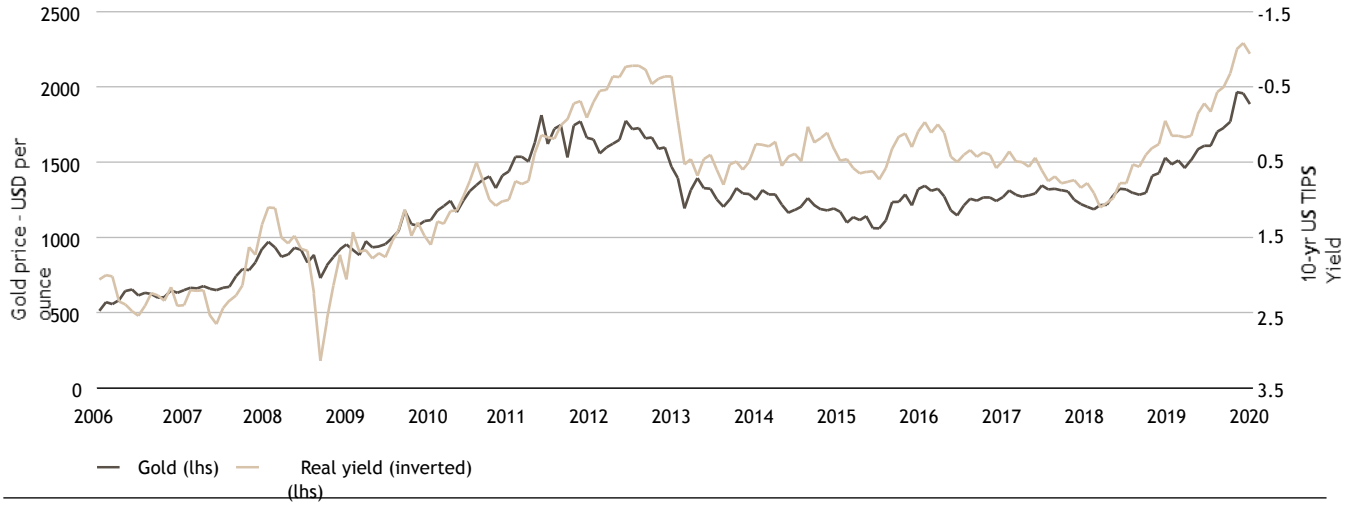
Exhibit 21: Commodity and traditional returns

Year	S&P GSCI Commodity	Bloomberg Commodity	Gold	Cash 1 Mo T-Bills	10-yr Treasury	S&P 500		US CPI In ation
Since 1991								
Geometric Return	-1.3	1.1	5.3	2.4	6.0	10.1		1.5
Arithmetic Return	1.0	2.2	6.3	2.4	6.1	10.8		2.1
Standard Deviation	21.3	14.5	15.3	0.6	7.0	14.4		1.3
Equity correlation	0.29	0.33	-0.02	0.02	-0.18	1.00	0.03	
In ation Correlation	0.35	0.26	0.04	0.15	-0.22	0.03	1.00	
Last 10 Years (June 2010 through June 2020)								
Geometric Return	-8.5	-5.8	3.6	0.6	4.5	14.0		1.7
Arithmetic Return	-6.5	-5.0	4.8	0.6	4.6	14.1		1.7
Standard Deviation	21.3	14.1	16.0	0.2	6.4	13.4		1.0
Equity correlation	0.55	0.55	0.08	-0.10	-0.45	1.00	0.02	
In ation Correlation	0.33	0.22	0.04	0.05	-0.11	0.02	1.00	

S&P GSCI S&P GSCI TR USD
Bloomberg Bloomberg Commodity TR USD
Gold LBMA Gold Price AM USD
Cash FTSE Treasury Bill 1 Mon USD
10-year Treasury BBgBarc US Trsy Bellwethers 10Y TR
S&P 500 USD S&P 500 TR USD
In ation IA SBBI US In ation

Source: Morningstar Direct. Analysis by Aura Asset Management.

Exhibit 22: Gold and real yields: 2006–2020



Source: Bloomberg. 30 September 2020.

6.1. Gold

Gold is one of the assets with the longest history and has played an enormous role in nance. However, with the constraints of gold-based currencies, national governments have moved to at currencies and don't promise any support in terms of gold.

Gold clearly behaves differently from other commodities. As the chart above shows, gold tracked the broad commodities index into the global nancial crisis, but diverted thereafter, continuing upward and doubling in value afterwards while commodities dropped.

Some argue that gold is not a commodity, but a currency. Some central banks do maintain positions in gold. The US dollar was unpegged to gold in 1972. We think that central bank purchases which are not always publicly announced have a material effect on gold price dynamics.

We do see a better case for gold over commodities in the historic data: higher returns, lower volatility, and a near-zero correlation with equities.

6.2. Commodities and gold as in ation hedges

One rationale for holding commodities and gold is that they provide protection against in ation. The historic data do indicate that commodities as re ected in the two major indices are correlated with in ation as measured by the US Consumer Price Index.

However, this is only a partial hedge. As services become a larger part of the economy and manufacturing declines, we would expect commodities to have a lower impact in overall CPI. The correlation of commodities to in ation is rather modest, ranging from around 0.1 to 0.4 depending on how it is measured.

Gold has demonstrated a mixed reaction to in ation. It performs well both in increases of unexpected in ation and large moves downward in in ation.

In sum, we agree that gold has its own cycle and idiosyncratic elements to it. Should in ation break out above the current level of expectations (2.0%) for developed economies, we would expect gold to do well and offer some of the best returns available in a rising in ation environment.

6.3. Summary

The recent performance of commodities has seriously dented passive commodities' attractiveness as a strategic asset class for institutional investors. Low in ation, the negative real return and positive correlation with equities has been strong headwinds for commodities.

The most compelling case for commodities is that global growth kicks back to a higher gear and the supply chains lag behind demand. Many of these commodities – like natural resources and infrastructure – require a large capital commitment and several years before extraction is done. A rising cost-pressure in ation world could cause equities and bonds slump in relative terms.

Also, there is a case for commodities for some investors from a holistic perspective. Countries that are resource-light such Korea or Taiwan or companies that are sensitive to commodities like transportation or steel may want to hold some commodity exposure to reduce overall risk. An airline or cruise line, for example, may want to add commodities in their portfolio to hedge oil risk for the overall organization.

7. Integration with traditional asset classes

Ultimately, investors need to blend traditional and alternative asset classes into a strategic asset allocation. The standard tool for SAA work – mean-variance analysis – works well with traditional assets, but runs into dif culties when applied to cash ow oriented investments. For cash ow assets, we must work with appraised assets with NAVs that don't re ect any sort of market transactions. Thus, NAV based volatility measures appear smoothed and underestimate actual volatility.

Further compounding the issue, these cash ow asset classes cannot be managed through market transactions, but through commitment schedules that require the investor provide
the liquidity to the general partner. This means a lagged adjustment to changing market events (which in turn is why fundraising is so cyclical).

Our approach is to develop two measures: appraised volatility and economic risk. The economic risk re ects the underlying, unsmoothed risk inherent in these investments. Investors should be aware of both measures.

7.1. Formulating return and risk expectations

Since alternatives cover a wide array of investment opportunities with different economic rationales, we need to use a wide array of approaches to formulate prospective returns.

To model real estate, we start with expected unlevered property returns and then adjust for leverage. Basic property has an income component and a price return component.
Historically, in the US the income component for the NPI has been around 4% to 5%. With in ation around 2.0% and a small real appreciation (after maintenance and capital improvements) of 0.3%, we currently estimate that unlevered property has a net return of 5.5%. When we adjust for fees, alpha and leverage, we get returns that begin approach long run equity returns: in the 6.2% range.

Our approach to setting private equity assumptions uses a multi-factor capital-asset pricing model type of approach and assigns higher betas to the relative public equities and additional idiosyncratic risk.[1] When we include some mezzanine nancing and special situations, we estimate that a private equity portfolio would have economic risks around 24% compared to our volatility of 15.0% to 16.0% for global equity portfolios.

As discussed in Section 3.3, our analysis nds that private debt funds appear to track the high yield market. Consequently, we model private debt related to the high yield market with a spread of about 80 basis points relative to the prevailing yield-to-worst.

Exhibit 23: Return and risk assumptions: USD Terms
September 2020

Asset Class	5-yr Expected Return	Economic Risk	Appraised Volatility
USD Cash	0.3%	1.3%	–
Intermediate Global IG Fixed Income	0.4%	2.6%	–
Global Investment Grade Fixed Income	0.0%	5.5%	–
Global Equities Unhedged	7.2%	16.0 %	–
Global High Yield Hedged Global Private	3.0%	10.5 %	– 15.0%
Equity Unhedged	9.5%	24.5 %	8.0%
Global Infrastructure (Equity) Unhedged	6.2%	14.0 %	7.2%
Global Core Real Estate Unhedged	6.2%	12.6 %	–
Hedge Funds (Hedged)	4.0%	4.3%	

Note: Expected returns are geometrc. We develop 5-year expected returns in the capital markets based on current market markets and our expectations of in ation, growth and the path of interest rates. We then overlay our assessment of fair value and the reversion and how quickly the market will react. From here we extrapolate to the different sectors of the capital markets. Global Equity, Private Equity, Infrastructure, and Core Real Estate are assumed to be unhedged. Cash, xed income and hedge funds are assumed to be hedged.
Source: Aura Asset Management. 30 September 2020.

1 See Korteweg (2018) for a good summary of the academic literature. Researchers nd that buy-out funds have betas relative to public markets ranging from 1.0 to as high as 3.0. Venture capital funds have lower betas, but much higher idiosyncratic risk.

Like real estate, we view infrastructure as a hybrid of equity and xed income. The median IRR for infrastructure funds by vintage year has been consistently below that of private equity by an average of 3.9%. Consequently, one simple approach is simply to discount the return to private equity by
an appropriate amount and set economic risk appropriate for such risk-bearing. This gives us net returns around 6.2% – similar to real estate, but with a different risk pro le.

We rely on a combination of historic relationships and basic heuristics to model hedge funds. As noted in the review of historic performance, fund-of-fund composites of hedge funds returns in the last 10-years have been about 2.5% to 3.8% above cash with equity betas around 0.30.

We believe that the prospect for hedge funds is encouraging. With low interest rates and low credit spreads across the world, the costs of borrowing are extremely low. This leverages the alpha opportunity set for all sorts of hedge funds – long-short, market neutral and macros funds –
and previously unpro table trades now look attractive. Additionally, the steeper yield curve offers all sorts of opportunities in xed income such as carry trades and roll return. This low borrowing cost environment should last for a few years, as central banks have indicated high thresholds for any rise in short term rates.

Another boost for hedge funds may be greater dispersion of returns, which will bene t strategies like equity long/short and relative. Additional tailwinds are ts of volatility and regime changes. These will allow trading-oriented macro managers
to exploit uncorrelated trades opportunities. It is synchronous moves in markets and within markets that don't allow hedge fund managers to apply their winners versus losers investment approach.

Finally, after moving sideways for a few years and a decline in the number of hedge funds, the industry is starting to regain momentum. We see positive cash ows as investors rebalance from the high equity returns and low government bond yields. Alternative investments that offer steady income or steady NAVs increases will be very attractive.

Commodities are a hard asset class to model. We have no demand-side or supply-side model to lean on as a starting point. Our only piece of nancial theory is that since these are futures contracts, the contracts will price in the opportunity cost of fully collateralized positions; thus, we expect a cash return plus a highly idiosyncratic element.

Investors are ultimately interested in net-of-fee performance and we need to assess both the fees and expected alpha from alternative investments. Because of the research costs and expertise needed to implement alternative portfolios, the management fees are extremely high compared to what is seen in public assets classes. The 2 and 20 model remains
the norm in private equity. Investors have pushed back on the some of the GP friendly terms in the contracts, so the implicit costs are not as large as they used to be, but the top line 2 and 20 is still the prevalent form of investing.

When we apply some representative allocations to the types of funds in Exhibit 2, we see that even in economic terms, the Sharpe ratios are sAura tantially better than the standard 60% global equities/40% global investment grade income. The appraised volatility is lower, as anticipated. The lower volatility for the very aggressive university endowment is sAura tantial: from 14.1% to 9.9%.

As can be seen, the appraised volatilities of real estate, private equity, and infrastructure make them highly attractive relative to public asset classes. Instead by projecting economic risk we move these asset classes more in line with the overall return and risk trade-off we expect in the capital markets.

Exhibit 24: Prospective 5-year Performance in USD Terms
September 2020

	Public Pension Plan	Sovereign Wealth Fund	University Endowment	Global Family Office	Standard 60/40
5-yr Expected Geometric Return	5.3%	4.7%	7.2%	5.3%	4.5%
Economic Risk	11.3%	10.0%	14.1%	10.3%	10.5%
Sharpe Ratio	0.50	0.49	0.56	0.54	0.46
Appraised Volatility	10.0%	8.6%	9.9%	8.3%	10.5%

Source: Aura Asset Management. 30 September 2020.

7.2. Managing cash shows

Along with adjusting for volatility to assess the trade-offs in return and risk, investors must grapple with the management of the commitment schedule for the cash ow alternatives (as well as gates and queues that occur with the semi-liquid asset classes). This means understanding the relationship between commitments and NAVs. If NAVs typically show only small premiums over cumulative contributions (I.e. they are marked at cost), we can use the projected contributions to estimate the amount of commitments necessary to reach target NAV levels. For example, in the cash show figures given in Exhibit 11, we estimate that investors should have uncalled commitments around 55% of the targeted NAV the private equity portfolio. Thus, if a plan has a target of USD100 million in private equity, this plan should have about USD55 million of uncalled commitments.

7.3. Implementation and practical issues

It is one thing to design a strategic asset allocation with alternatives; it is another to implement them. They require a larger staff than other asset classes and a quick decision-making structure. Co-commitment programs require yet more additional staff.

One element of staffing is legal review and monitoring of terms. The private nature of most of alternative assets means that there are few standard contractual terms. Issues are constantly arising – allocation of expenses, incentive and base-fee formulas, use of ssubcriptions lines of credit, and co- investment terms – that demand expert legal evaluation.

Moreover, it requires a balance of process in governance, due diligence with nimble decision-making, which can be dif cult when there are multiple stakeholders and public oversight.

Perhaps that is why the endowment community has been so successful in implementing alternative portfolios: quick decision-making structures with wide authority given to the CIO to implement as attractive deals come along.

Small investors have several disadvantages and must out- source some of the implementation and management. Minimum sizes and large search costs make it difficulty in achieving significant diversifacation not only cross-sectional, but across vintage years as well. Thus, they have large concentration risk as there is wide variation in results across funds.

Investors often look at alternative investments searching for an immediate bump in return; however, the j-curve for many of the private capital assets means that the superior returns are delayed for a few years (about 5 to 7 years) until a portfolio matures and begins returning distributions. Investors can accelerate this by going in the secondary market, but they are also time-consuming, resource-intensive efforts which can still take many months to compete.

Another thorny problem in alternative investments is benchmarking and assessing performance. The cash ow nature of private equity, infrastructure and other closed-end funds means that it can several years to build mature portfolios and move to target allocations. Proper assessment of performance is very dependent on adjusting for vintage year performance and even then, this is compounded by the lag in data reporting and the fact that it can take ve to ten years to assess whether a fund was a success. Hedge funds are another area with huge benchmarking concerns. Often investors sent a simple benchmark related to cash rates (T-Bills + 4%, for example) with volatility and correlation targets.

Small investors are at a disadvantage in implementing alternative investments. First, they cannot afford the staff and expertise necessary, but additionally, given the 'lumpy' nature of the minimum investment size, it can be dif cult to build properly diversi ed portfolios.

One area that we expect more innovation is in vehicle design that will allow these smaller investors – and potentially even retail investors – access to these markets.

8.
Summary

The alternatives market has evolved over the last 30 years and has gained wide acceptance with investors. What was once obscure and mysterious, it now standard for many institutional investors. We now have enough experience to understand how they perform and react in different market environments.

The primary rationale for alternatives is their ability to improve the risk/reward relationship for investors – certainly on an appraised basis, but on an economic basis as well. Going forward, we believe that returns will be lower than their historic averages – but this is generally true of the public markets as well, particularly xed income. The diversi cation bene t will remain and we continue to see more evolution and innovation in the marketplace.

One big caveat for many investors is implementation. Alternatives require higher levels of oversight and management than those offered in the public markets. The search and due diligence costs are high due to the closed-end and/or private nature of many of the investments. These portfolios require sophisticated staffs to build and maintain these portfolios, or high out-sourcing costs.

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