REAL ASSETS

Real estate and infrastructure: The same, but different

AXA IM – Real Assets, Research & Strategy

March 2017

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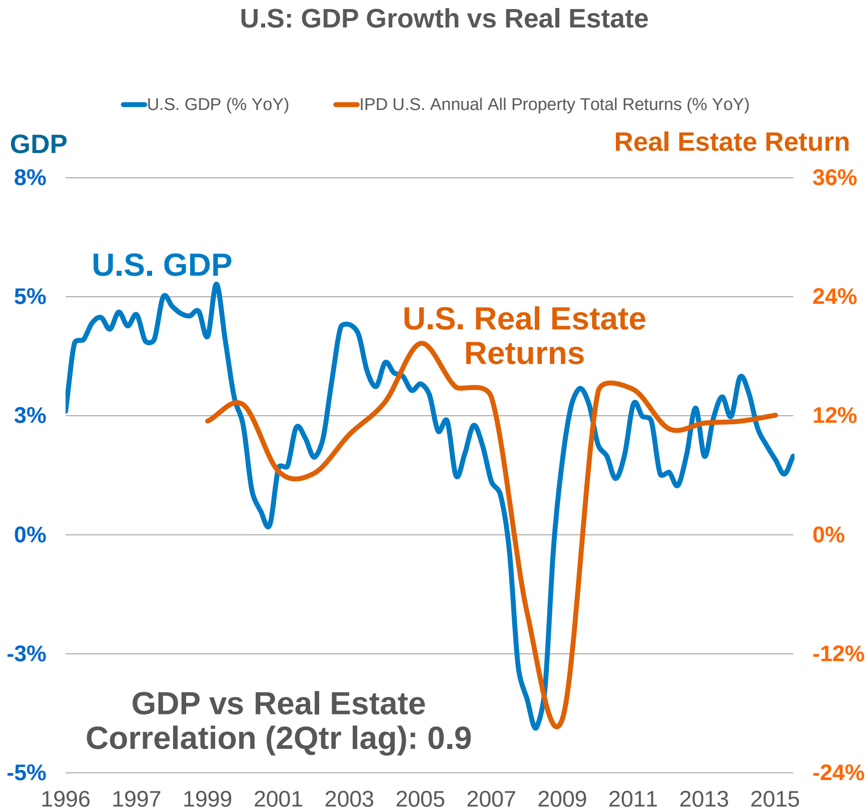
Focus

- Drivers of real real estate performance
- Governments and the private sector as drivers of infrastructure delivery
- Infrastructure sector activity: cyclical and secular shifts
- Market activity
- Summary

What drives real estate returns?



Source: Macrobond, MSCI (data as at 19 January 2017)

Source: Macrobond, MSCI (data as at 19 January 2017)

Real estate returns largely driven by economic growth

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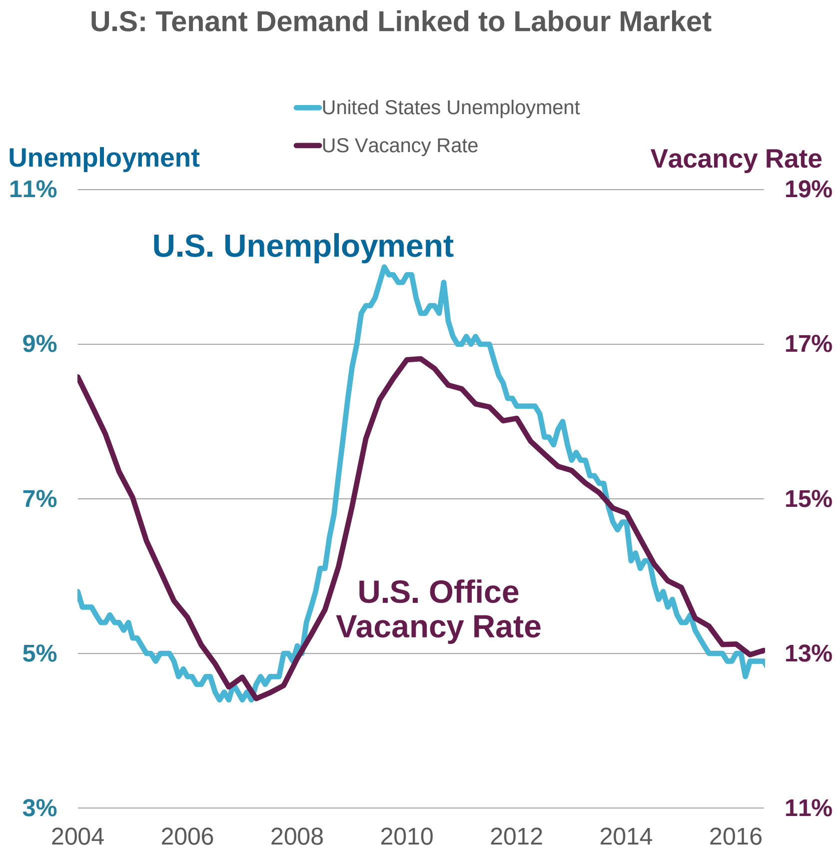
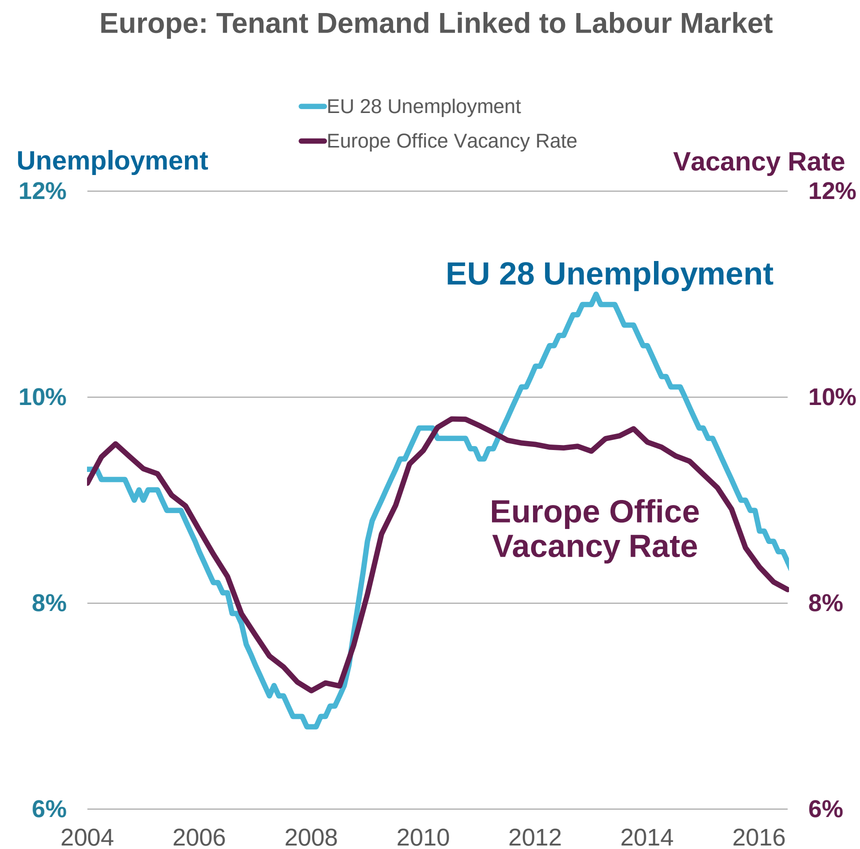
Relationship between economy and real estate extends to occupier fundamentals



Source: Macrobond, CBRE (data as at 19 January 2017)



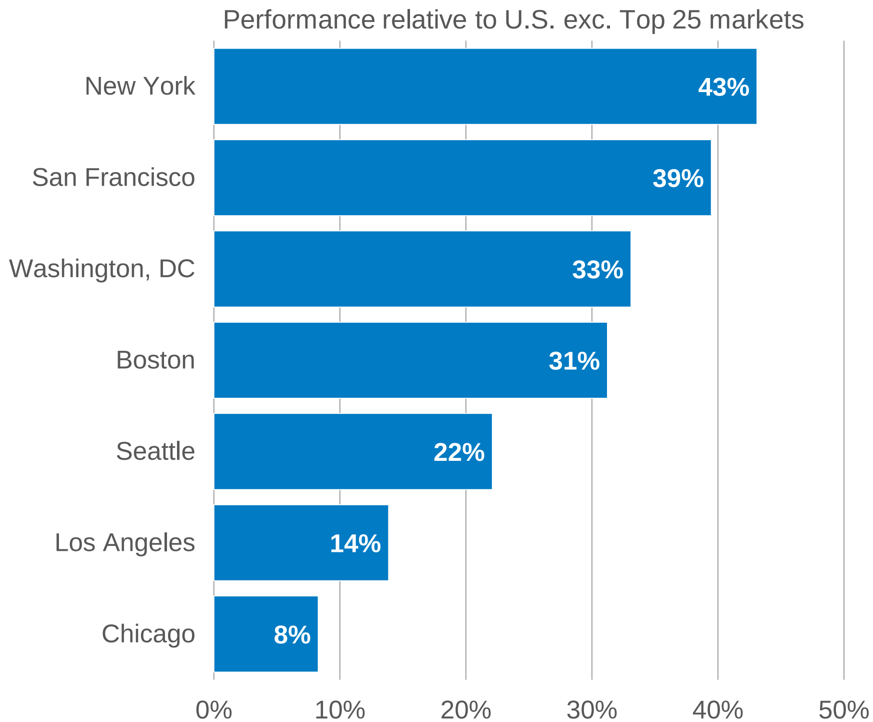
Source: Macrobond, CBRE (data as at 19 January 2017)

Note: U.S. office vacancies include the entire metro area, whereas European office vacancies only include the real estate market area, as defined by CBRE. As a result the U.S. vacancy rate tends to be systematically higher than the European data

Office markets are heavily reliant on labour market trends

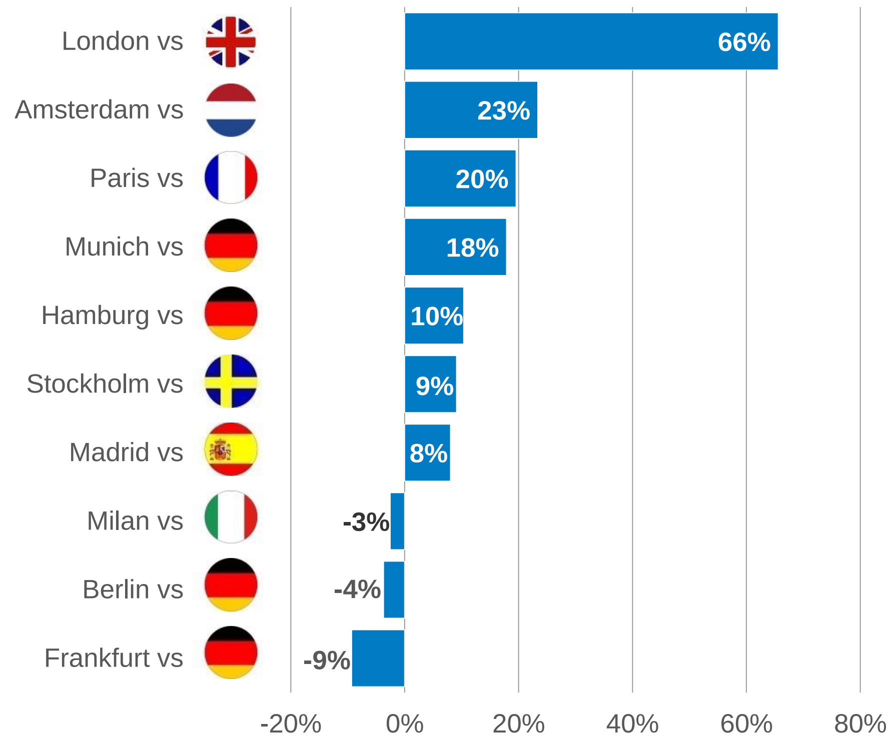
Urbanisation leads to a focus on global cities, which typically outperformed regions over the last cycle

Major cities outperformed U.S. excluding Top 25 (Office 2007-2015, Cumulative Value Change)



Source: CoStar, AXA IM – Real Assets (data as at January 2017)

Major cities outperformed national market (Office 2007-2015, Cumulative Value Change)



Source: MSCI, AXA IM – Real Assets (data as at April 2016)

Note: "Regions" and "National Market" exclude the comparison city, i.e. London vs UK excluding London.
U.S. cities are compared to the U.S. aggregate excluding the Top 25 markets: the cities shown above plus, Houston, Dallas FW, Philadelphia, San Jose, Orange County, Atlanta, San Diego, Miami, Phoenix, East Bay, Denver, Northern New Jersey, Austin, Minneapolis, Baltimore, Sacramento, Long Island, Portland OR

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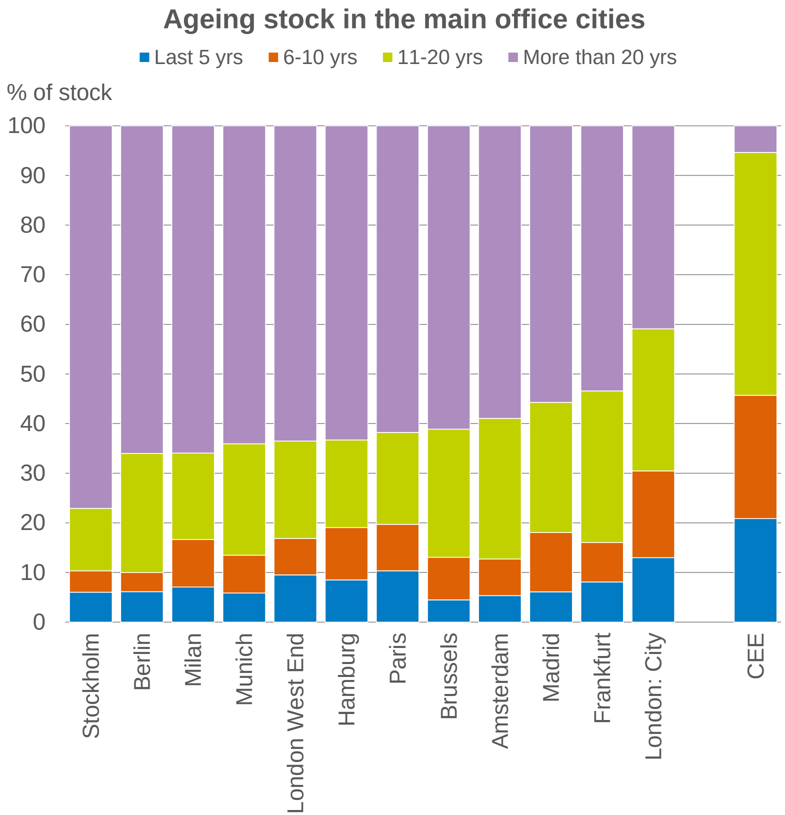
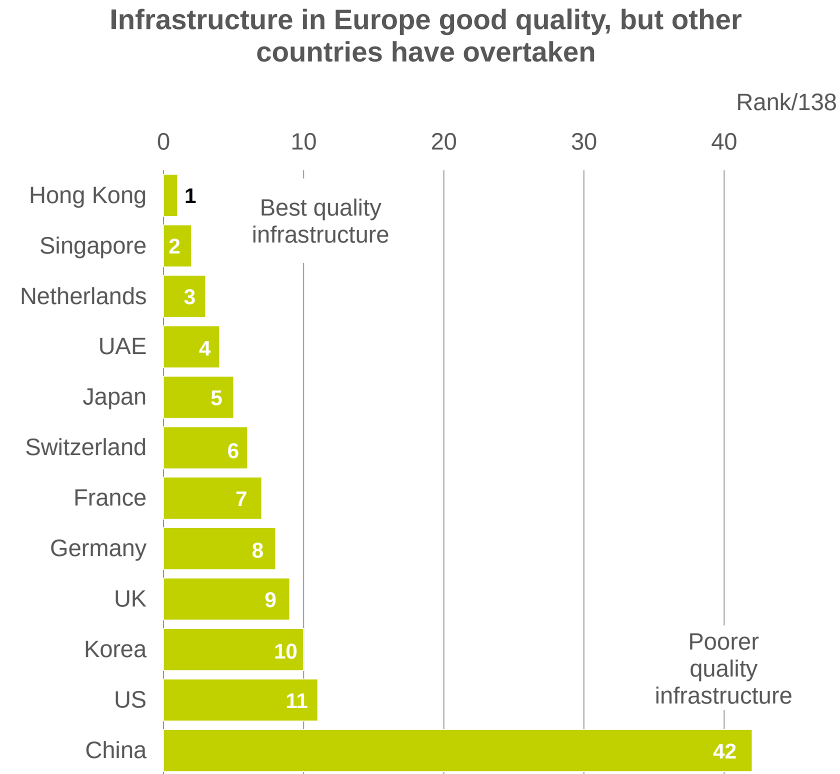
Continual investment required in real estate and infrastructure stock



Source: PMA, AXA IM - Real Assets, data as at Autumn 2016
NB: CEE is Budapest, Prague, Warsaw

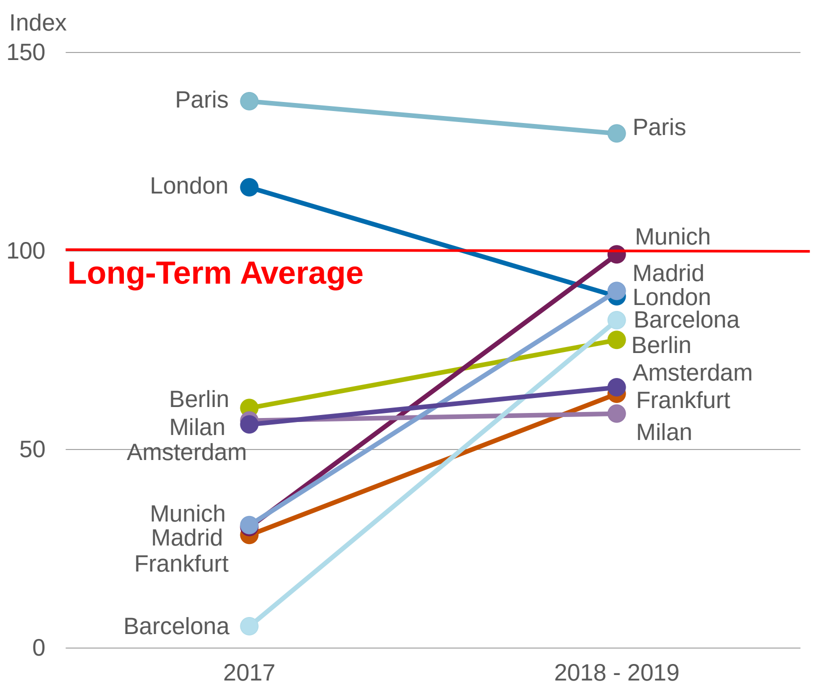


Source: World Economic Forum Global Competitiveness Report 2016-17, AXA IM – Real Assets, data as at September 2016

Without ongoing investment or asset renewal, quality and effectiveness likely to suffer

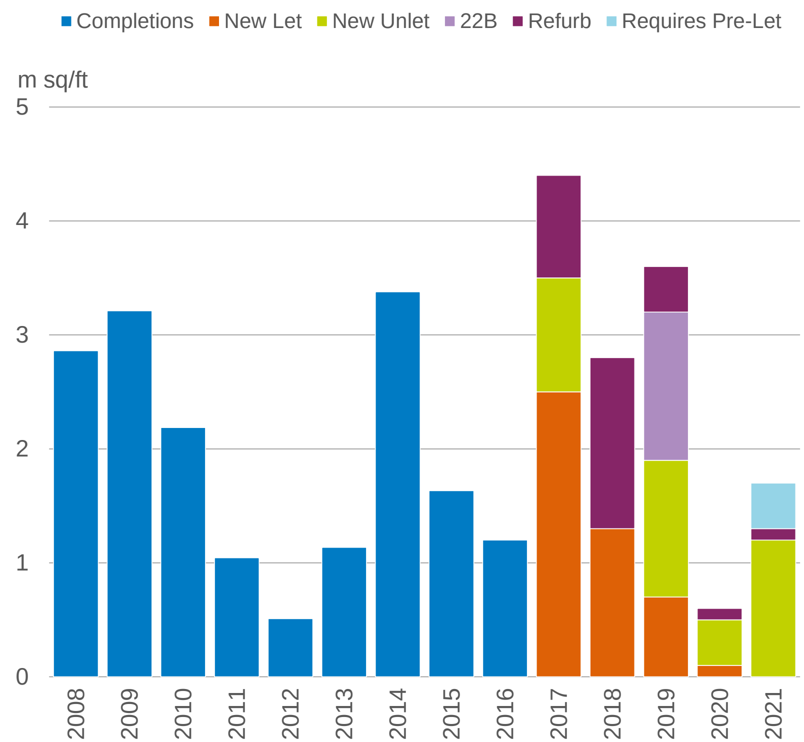
Development can threaten real estate rental growth, but new supply currently appears in check in most locations

Relative Office New Supply Pipeline



Source: PMA, AXA IM – Real Assets, data as at Oct 2016
Note: 100 = 1991-2016 average

London City Supply Pipeline



Source: CBRE, AXA IM – Real Assets, data as at February 2017

Much more difficult (but not impossible) to over-supply infrastructure assets

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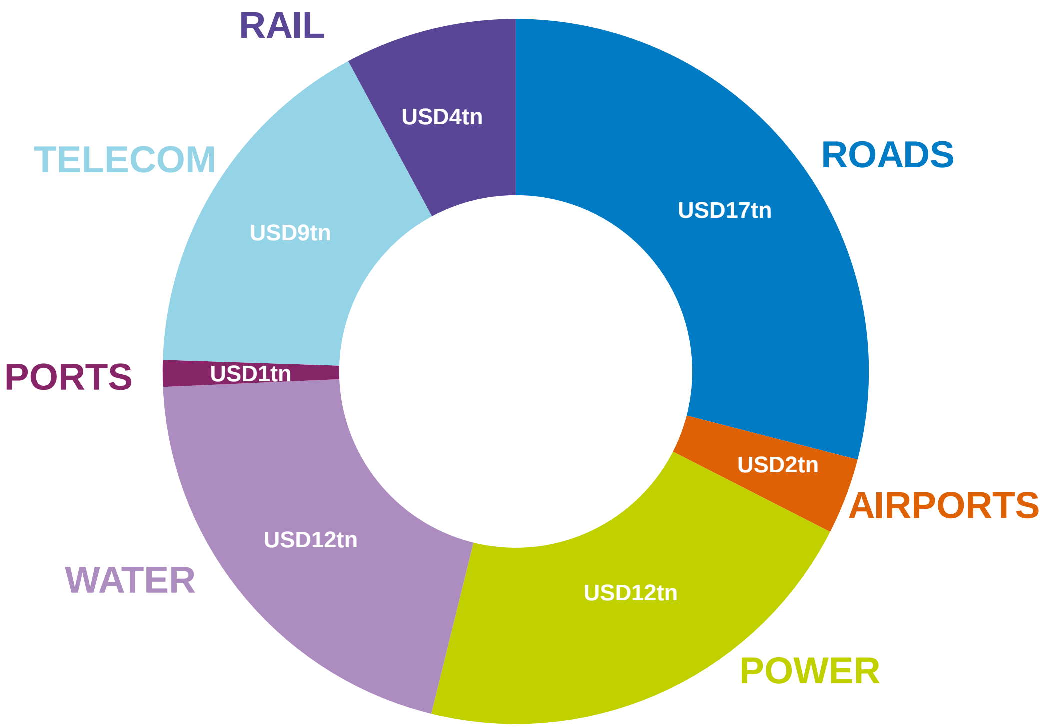
Significant increase in infrastructure investment needed: Private sector has an important role to play

USD57 trillion of infrastructure investment required out to 2030



Source: McKinsey & Co, Global Insight, AXA IM – Real Assets, data as at June 2016
Data at 2015 prices

Infrastructure investment has been falling in many 'developed' countries

- Current rate of global investment results in an annual shortfall of USD350bn p.a
- Shortfall increases significantly if investment to meet the UN Sustainable Development Goals is included
- Developed economies account for 40% of the annual USD3.3tn investment requirement

Increase in global infrastructure spending required to meet future needs

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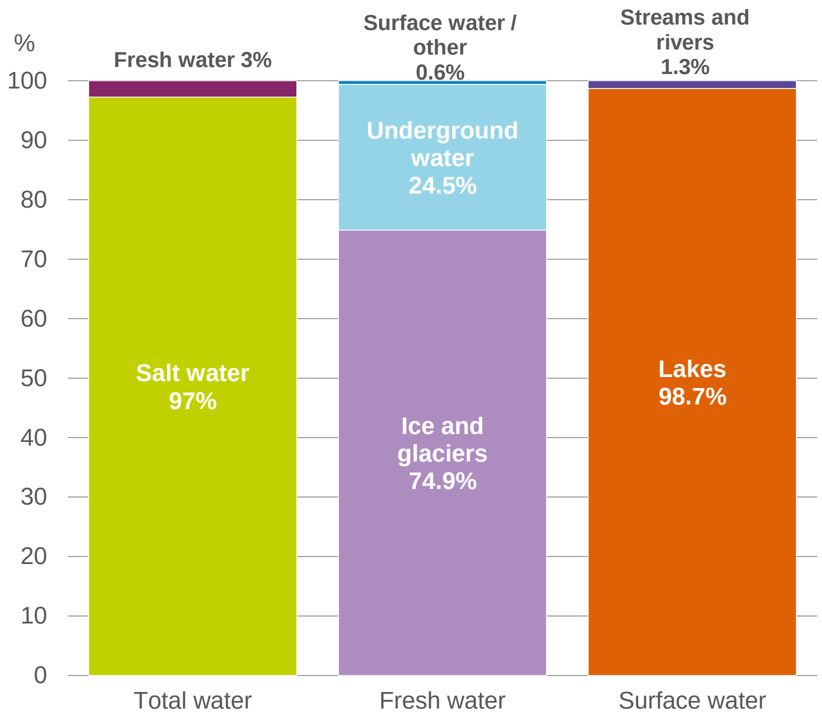
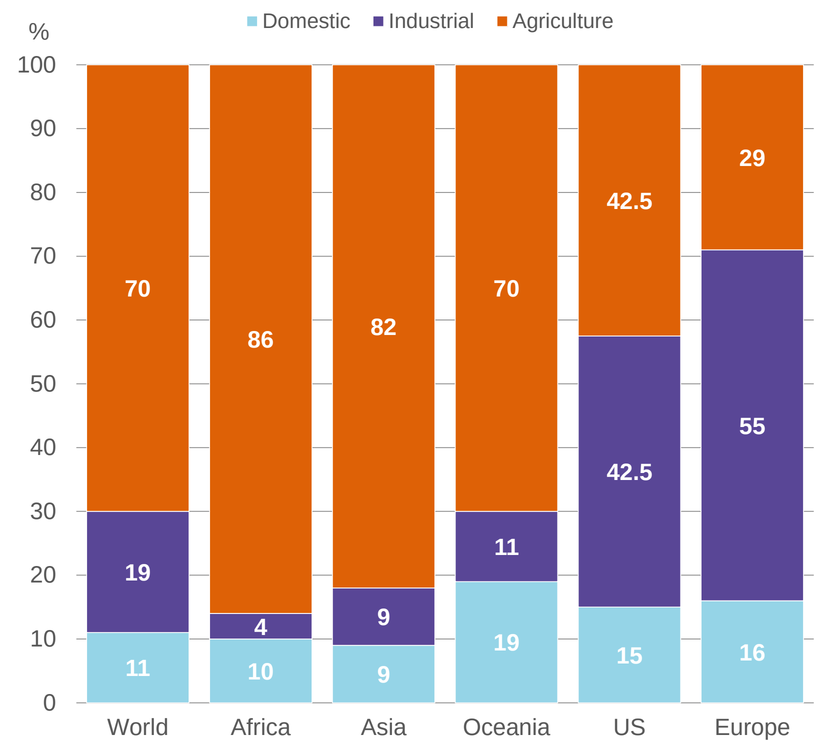
Water: abundant source but limited availability – demand tied to industrial growth in Western economies



Source: PwC, AXA IM – Real Assets, 2012 data as at October 2016



Source: UN Food & Agriculture Organisation, AXA IM – Real Assets, data as at Oct-2016

Across US and Europe, industrial demand links water use to GDP growth

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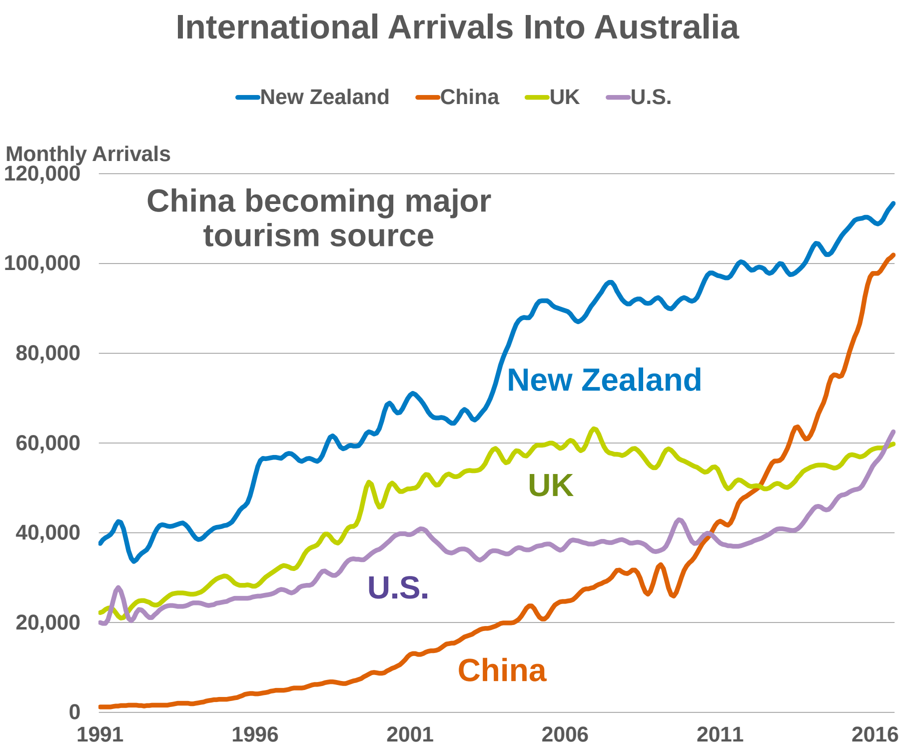
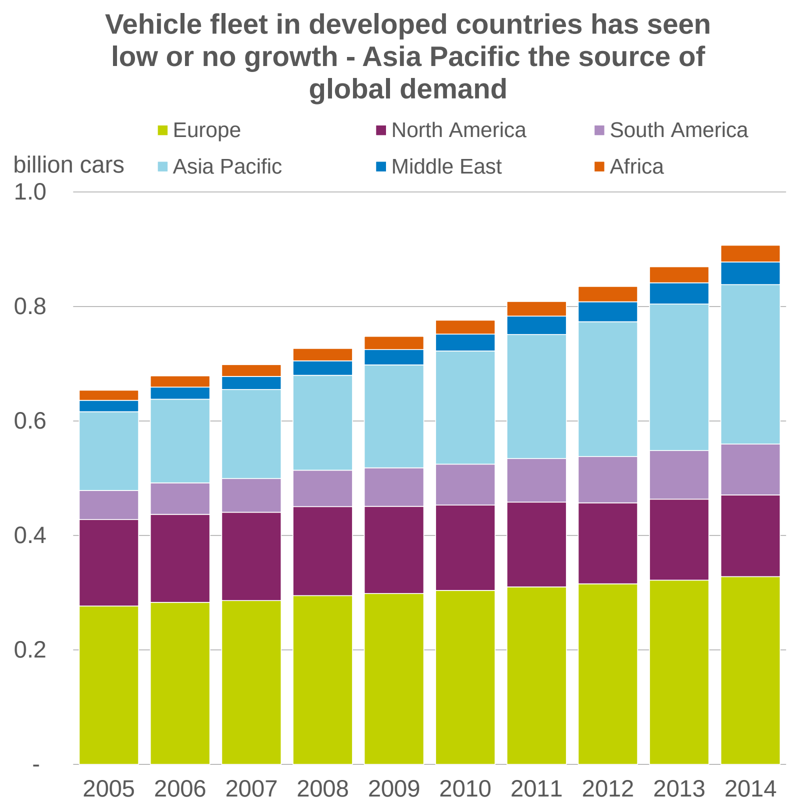
Transport: networks must evolve along with shifts in demand



Source: Australian Bureau of Statistics (data as at October 2016)



Source: International Organisation of Motor Vehicle Manufacturers, AXA IM – Real Assets, 2014 data as at October 2016

New technologies could change the face of transport - investment needs to keep pace

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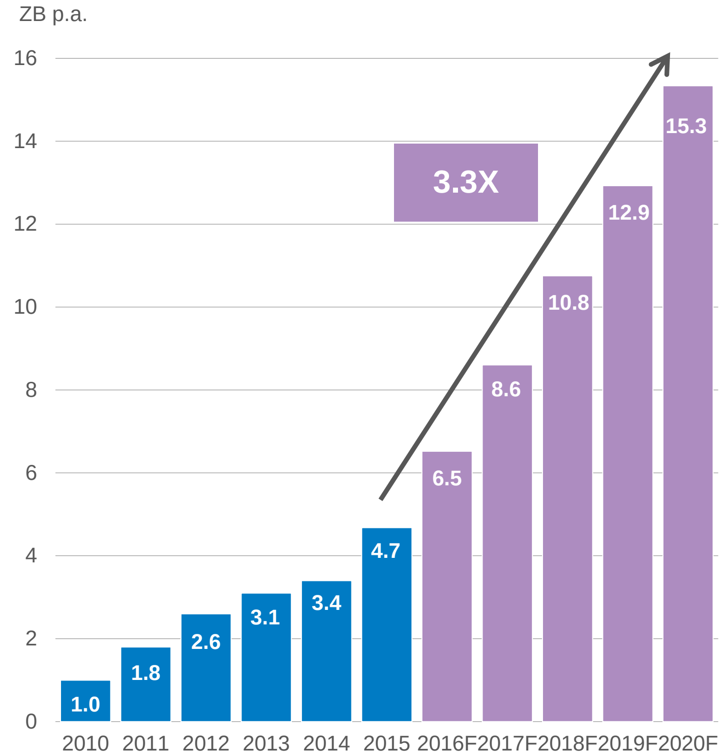
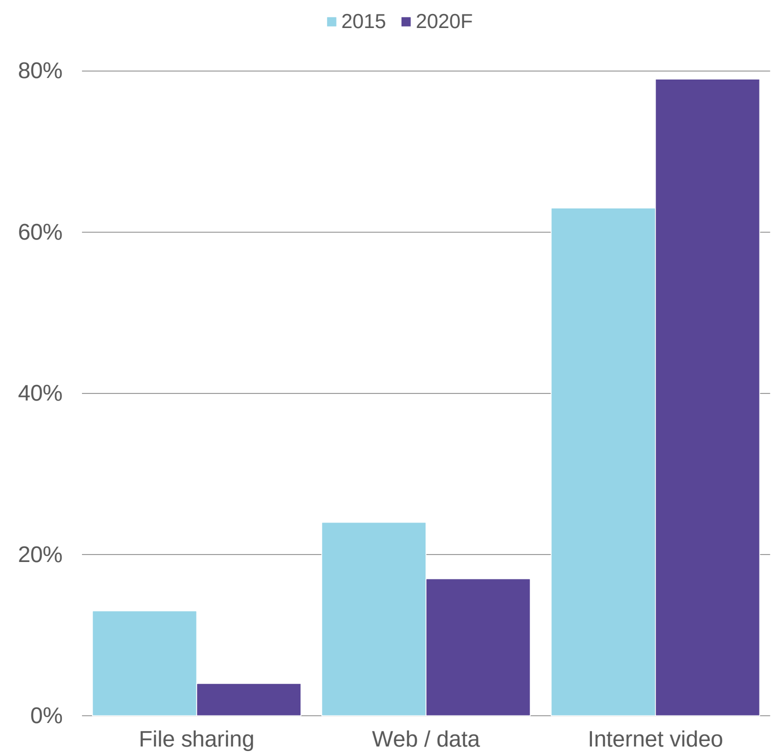
Digital infrastructure: data centre and fibre network investment required regardless of wider economic cycle

2015 – 2020F: DC traffic growth 27% p.a.



Source: Cisco Global Cloud Index, AXA IM – Real Assets, data and forecasts as at January 2017

Video the biggest and fastest growing area



Source: Cisco, AXA IM – Real Assets, data and forecasts as at January 2017

High-definition video likely to drive future growth in data consumption

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Driverless cars: the future

Driverless car data vs human created data

In 2020, the average driverless car may process 4,000GB of data per day, while the average internet user is expected to process 1.5GB*

1 driverless car = 2,666 internet users

Data created by driverless cars globally could reach 2ZB/day – **almost equal to the total amount of data centre traffic in the whole of 2012**

- Assumes driverless reaches 50% of the world's 1bn total fleet – possibly achieved in 25 years**
- Tesla: cars using Autopilot mode have travelled 222m miles***
- Google: self-driving car, 2m miles travelled (13 minor accidents – none the fault of the cars***)

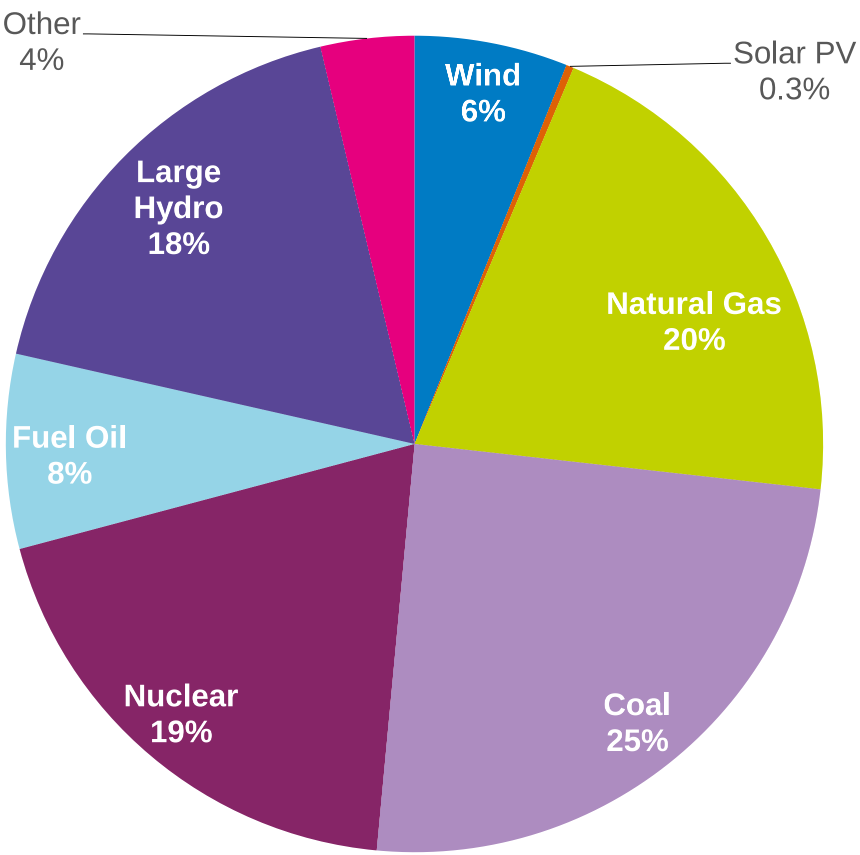
** Source: Intel, AXA IM – Real Assets, data as at November 2016*
Images: Waymo and Bigstock Photo, as at February 2017, for illustrative purposes only

*** Based upon IHS and McKinsey forecasts as at 2016*
**** Waymo data as at January 2017*

Data generated by driverless cars could dwarf that from other sources

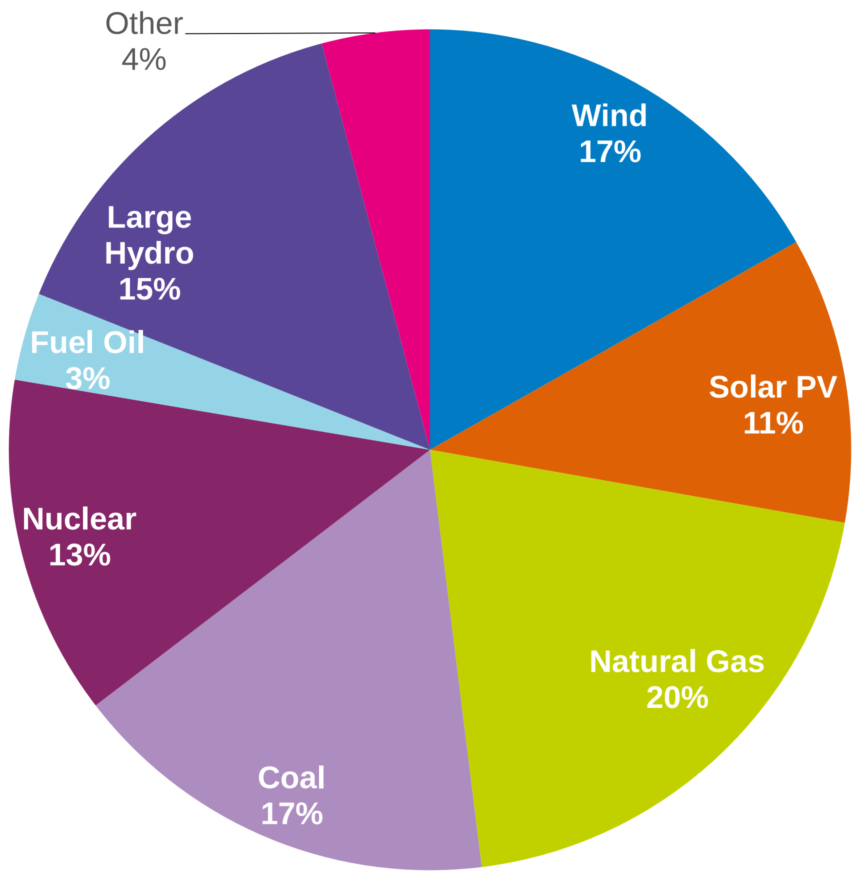
Energy generation composition is evolving fast, particularly in Europe, as economies decarbonise

European capacity 2005: 676GW



Source: WindEurope, AXA IM – Real Assets, data as at February 2017

European capacity 2016: 918GW

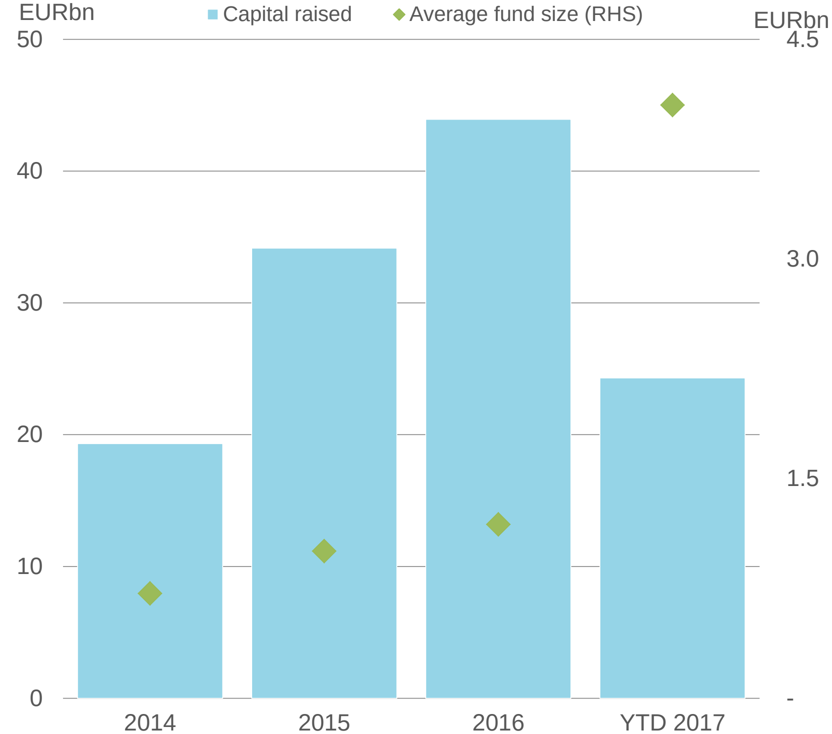


Source: WindEurope, AXA IM – Real Assets, data as at February 2017

Pressure on government finances a risk for infrastructure: private sector playing its part but more to do

- Government finances – debt levels and focus on austerity
- Shifts in priorities – lack of appetite for subsidies, switch back towards fossil fuels
- Financing costs, given the level of debt used to fund projects
- Cyclicality – regulated industries subject to short-term cycles see investment (and jobs) peak and trough
- Inability or unwillingness to price construction risk

More capital allocated to infrastructure: fund sizes are growing



Source: InfraDeals, AXA IM – Real Assets, data as at March 2017

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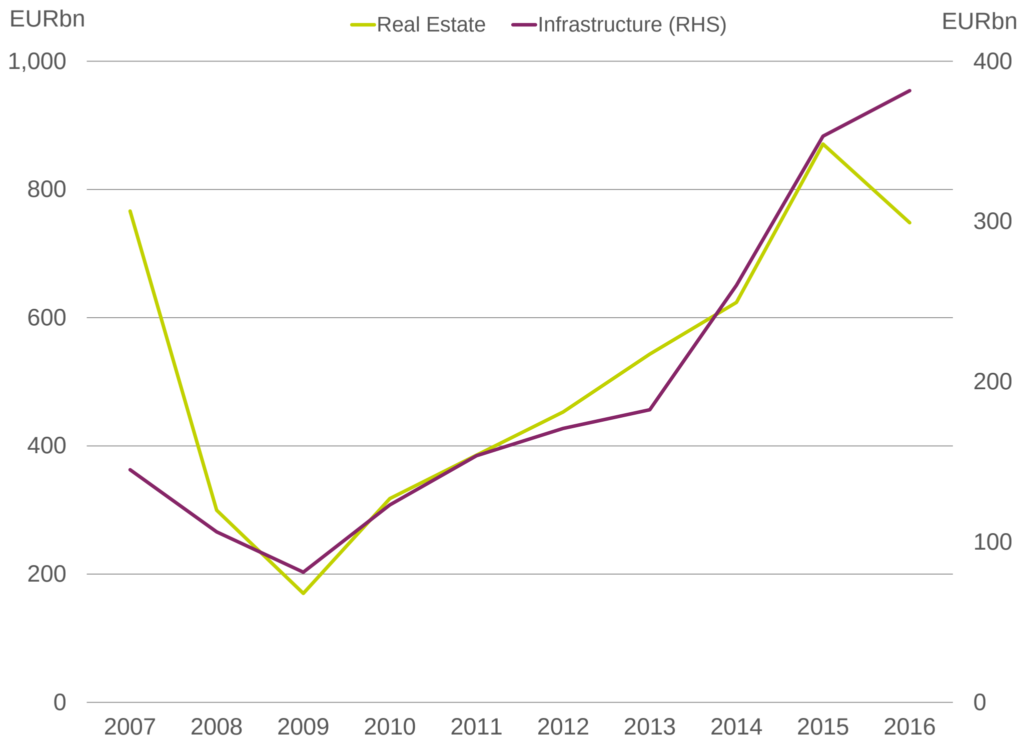
Real estate and infrastructure transactions have followed a similar path post the GFC

Global infra transactions followed that for real estate post GFC: market size is smaller



Source: InfraDeals, RCA, AXA IM – Real Assets, as at March 2017

Real estate and infrastructure markets staged a sharp increase in transactions post the GFC

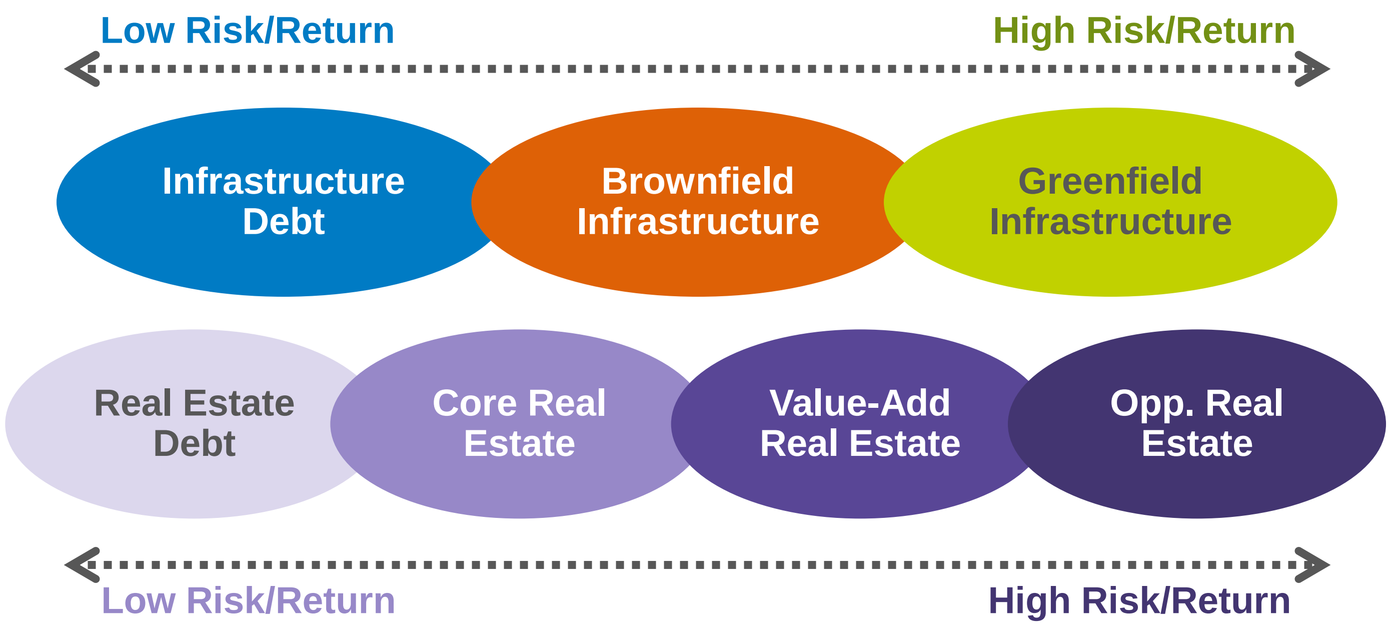
- The US accounts for the largest share of real estate transactions (2009: 24%, 2016: 51%)
- Europe has seen its share of infrastructure transactions fall (2009: 65%, 2016: 35%)
- Asia has experienced the largest increase (2009: 12%, 2016: 37%)

Europe has seen both its share of real estate and infrastructure transactions fall

Infrastructure investment opportunities are as diverse as those offered by real estate

Example
Renewables Debt,
Airport Debt
Returns: 2-6%

Example
Telecoms Infrastructure,
Airports and Seaports
Returns: 14-20%



Source: AXA IM – Real Assets
For illustrative purposes only

Capital is waiting for these opportunities:

- YTD capital raised by unlisted infrastructure funds is already more than half that for than whole of 2016 (EUR24bn vs EUR44bn)
  Source: InfraDeals (as at March 2017)

Infrastructure has more to offer than just long-term income

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Summary:

Real estate and infrastructure share many common drivers – primarily a link, direct or indirect, to GDP growth but this is not true for all sectors

Real estate and infrastructure benefit from major shifts in underlying demand, be that a move to online retail boosting logistics demand or shifting energy generation composition

Infrastructure is a diverse sector, offering investors more than just long-term income

Both asset classes are experiencing rising demand from global investors, as they diversify and seek greater returns, many aiming to match income to future liabilities

Infrastructure remains a market dominated by government policies, backed by private sector capital and this is unlikely to change in the future

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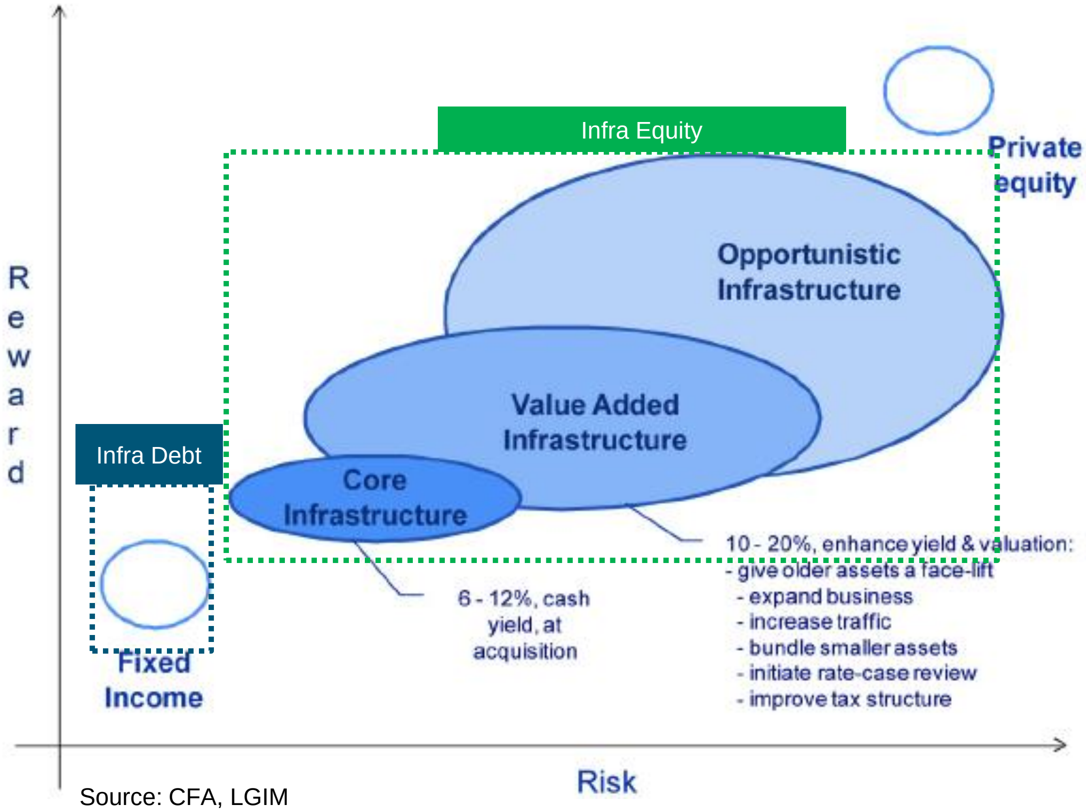
Performance Measurement of Private Infrastructure

Declan O’Brien, Infrastructure Strategist

Agenda

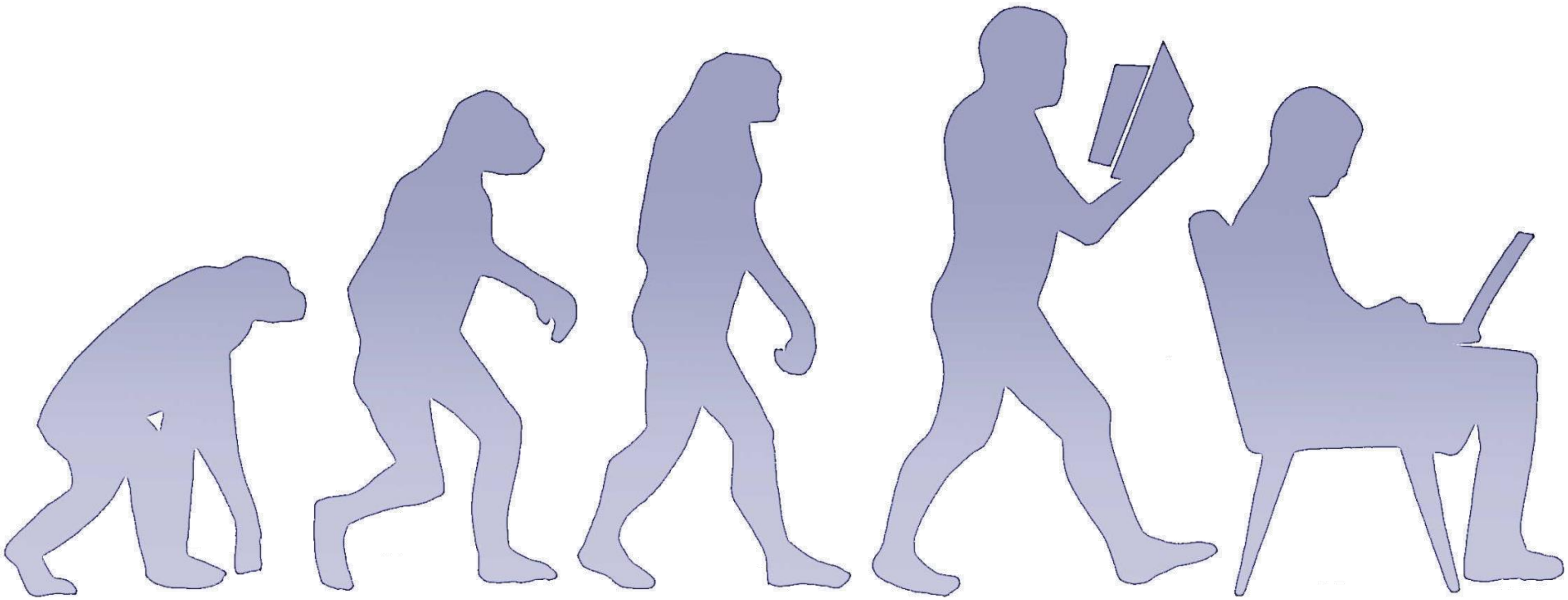
- Mapping the infrastructure universe
- Where are we now? – property vs. infrastructure benchmarking
- Overview of property benchmarking
- The infrastructure journey
- What tools are investors using to benchmark infrastructure
- Challenges/ obstacles to infrastructure benchmarking
- What next?

Mapping the infrastructure universe



Source: CFA, LGIM

Where Are We Now?



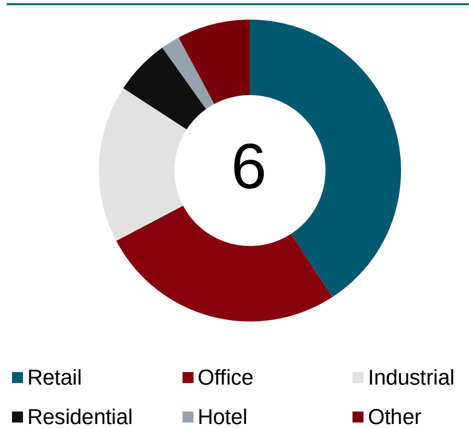
INFRASTRUCTURE 10 YEARS AGO! → INFRASTRUCTURE NOW

PROPERTY

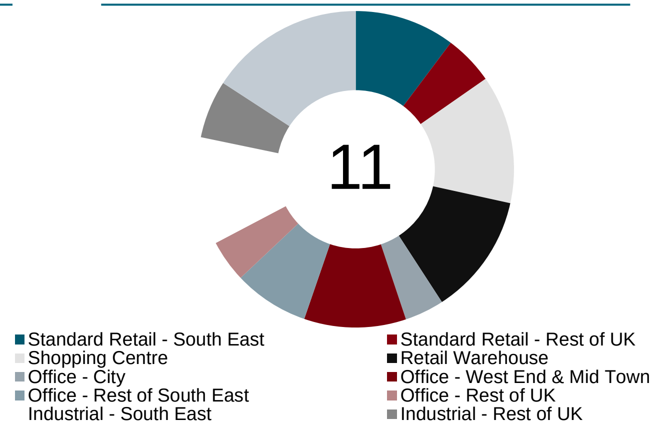
Overview of Property Benchmarking

- Investor-led initiative in UK; benchmarking now enshrined
- Well-established industry sector and sub-sector classifications
- Large sample sizes across most sub-sectors allows for “accurate” benchmarking
- Performance vs. peer group linked to remuneration
- Performance typically based on total return, i.e. income return + capital return
- Capital return validated based on quarterly valuation reports

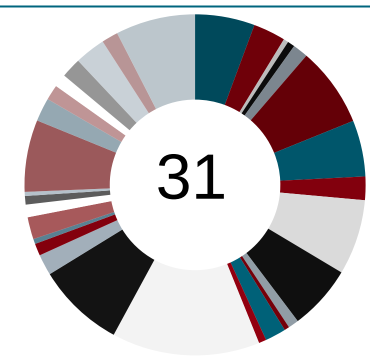
Global Property Class Sectors



Standard Industry Segments



Granular Sub-sectors

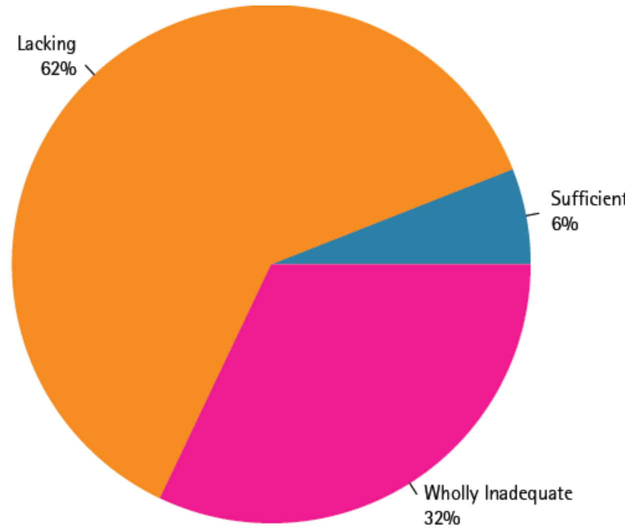


Source: IPD

The Infrastructure Journey

- Another equity or riskier bond-like return?
- AIMCo (2012) described infra benchmarking as a "hodgepodge" of approaches
- First indices suffered from generic aggregation of data
- Useful for asset class education but unsuitable as a measure of manager/fund performance
- Most recent initiatives are more sophisticated and provide better data points, but further work needed to match property

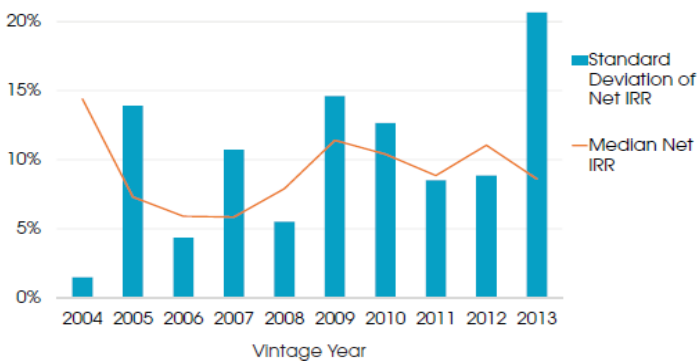
Survey results describing infrastructure benchmarking options



Source: EDHEC*infra*/GIH Survey (Blanc-Brude et al., 2016)

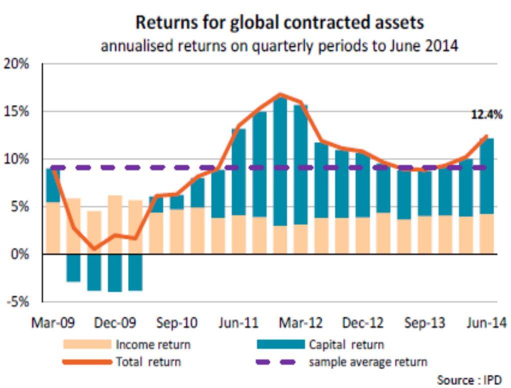
What Tools Are Investors Using to Benchmark Infrastructure?

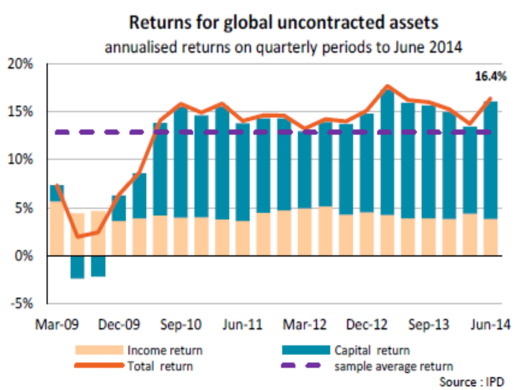
Preqin: Global Infra Risk/Return by Vintage



EDHEC/ LTIIA: Contracted Infrastructure Fund

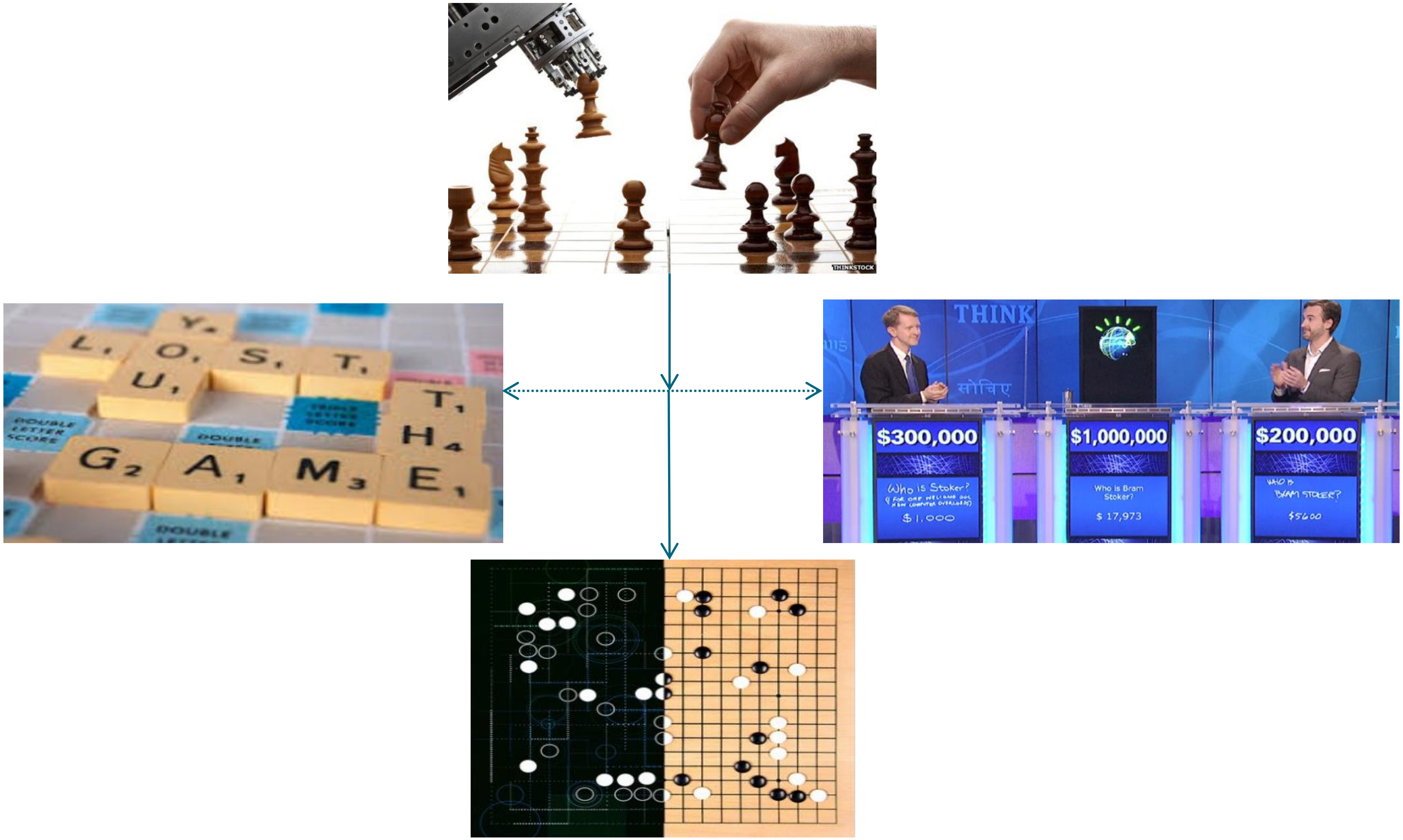
MSCI Global Infrastructure Index





Markit Iboxx Infrastructure Debt Indices (with DB)
Markit Iboxx GBP Infrastructure Index
Markit Iboxx EUR Infrastructure Index
Markit Iboxx USD Infrastructure Index
Markit iBoxx USD High Yield Infrastructure Index

Major Improvements Driven by Human Intervention…For Now



Challenges/ Obstacles to Infrastructure Benchmarking

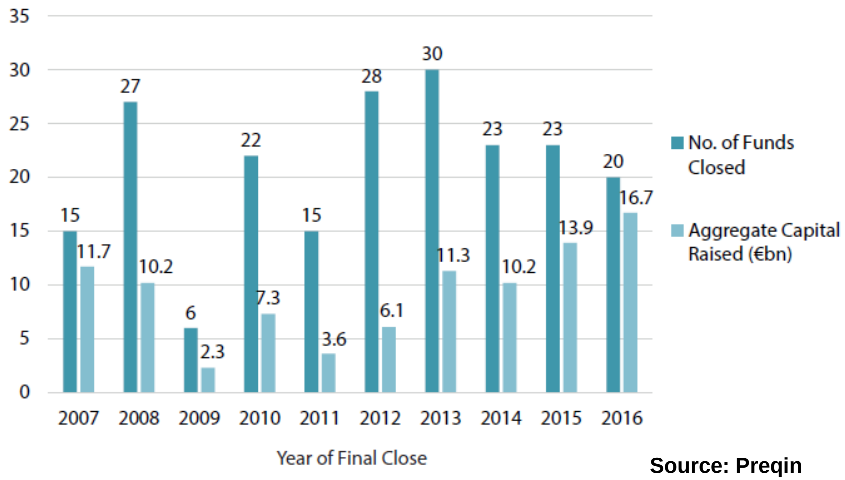
- Immature market with small sample sizes
  - Perhaps, no benchmark is better than a bad benchmark
- Data collection
  - Heterogeneous asset class with wide scope of risk
  - Sectors and risk profile need standardised reporting
- Asset valuations
  - Few secondary data trading points/ full-cycle assets
  - EDHEC survey found that only half of investors trust valuations
- Motivation
  - Property investor led; will investors demand the same from infrastructure?

What Next?

- Immature market with small sample sizes
    - ➢ Infra AUM annual growth of 35% since 2011

- Data collection
    - ➢ Already big steps in this area, but further improvements needed

Fig. 4.15: Annual Europe-Focused Unlisted Infrastructure Fundraising, 2007 - 2016



Source: Preqin

- Asset valuations
    - ➢ No obvious path to overcoming valuations
    - ➢ Benchmarking should be easy for concession-based infrastructure, i.e. more focused on income, less need for valuations
    - ➢ Total return over fund may be most relevant measure for rest of industry

- Motivation
    - ➢ Lack of benchmarking does not seem to be impacting fundraising
    - ➢ However, it will become more important for core infrastructure strategies as IRRs continue to fall
    - ➢ The industry needs to work together to showcase asset class to increase allocations to sector

Long-term Infrastructure Investors Association

Regulating Infrastructure

landmarks, trends, challenges

Eugene Zhucheko
Executive Director, LTIIA

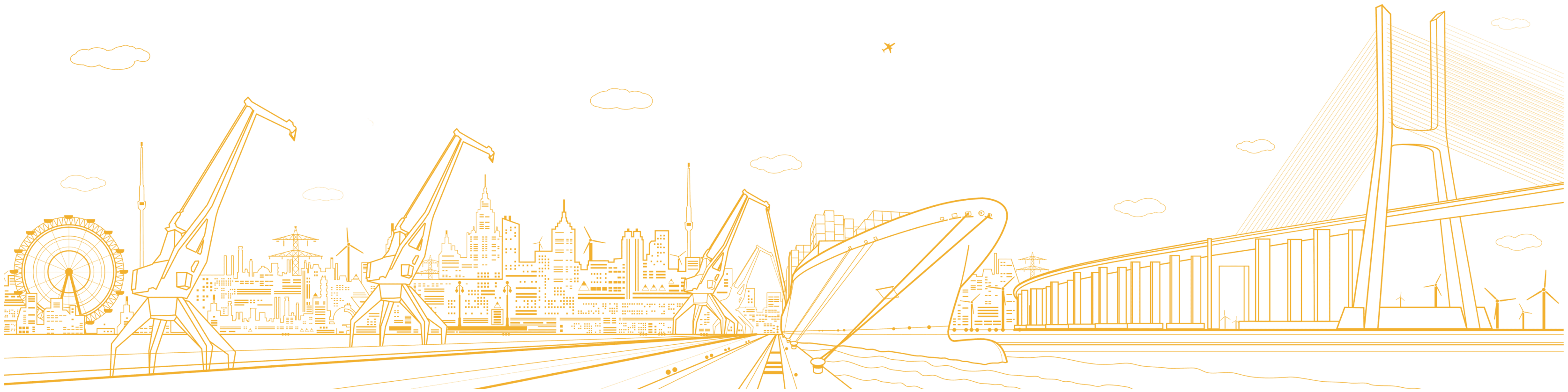
March 24, 2017

Why regulation?

Essential Services for Community

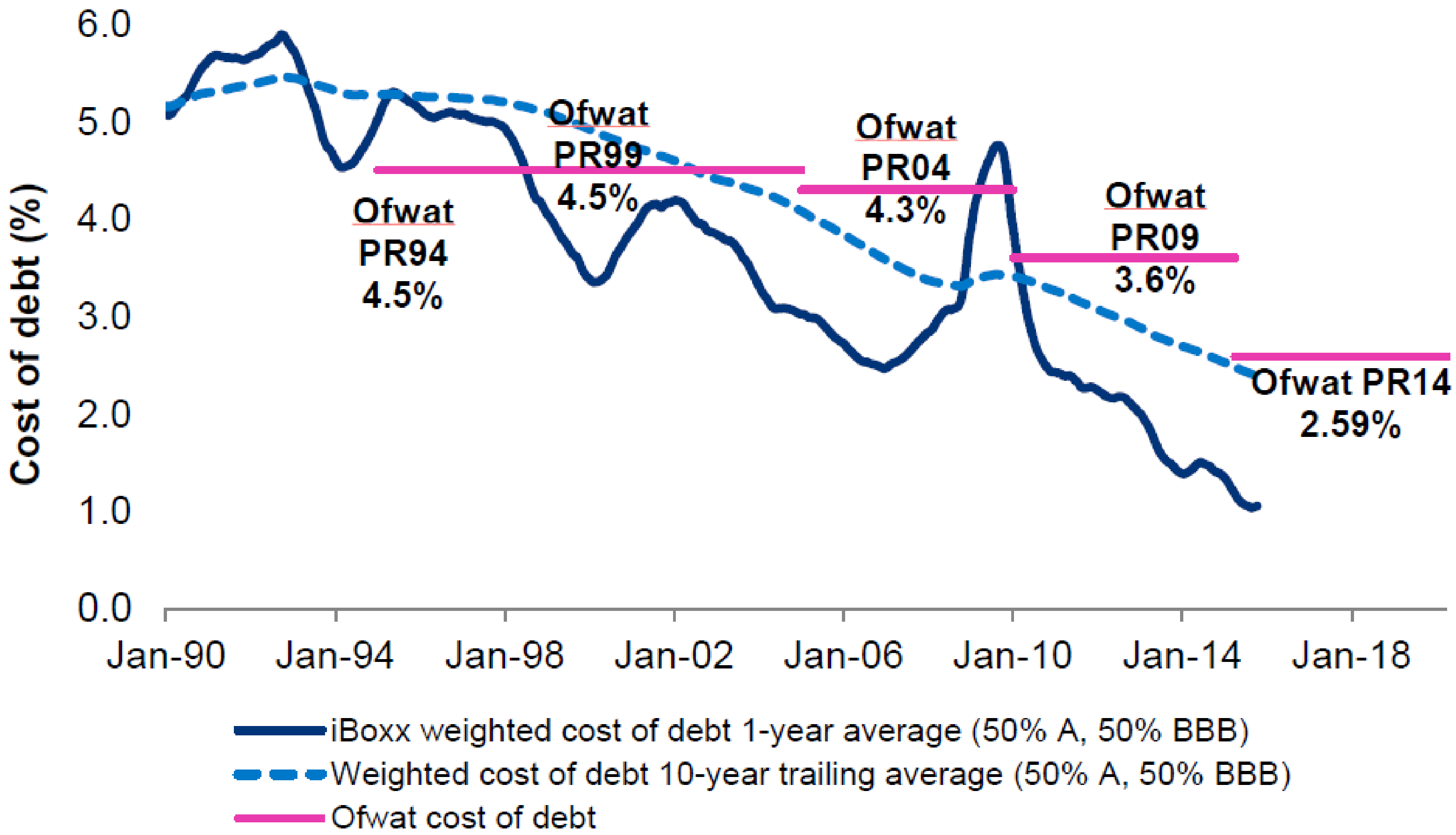
Large scale operations

Financial Risk Management



Sector Regulation

Ensure that private investor earns a reasonable return



Source: OfWat

Asset Class Regulation

Solvency II: stipulates *risk charge* for maintaining reserves by insurers and pension plans

INVESTMENT CLASS	SUB-RISK-MODULE	STRESS IN %	ADJUSTMENT
Shares Type I	Equity	39%	range +/- 10%
Shares Type II	Equity	49%	range +/- 10%
Private Equity	Equity	49%	range +/- 10%
Hedge Funds	Equity	49%	range +/- 10%
Infrastructure Equity Capital	Equity	30%	n. a.
Strategic Participations	Equity	22%	-
Property	Real Estate	25%	-
EU-Member State Bonds	Spread	0 %	-
Corporate Bonds	Spread	Dependency on Rating and Maturity	-
Covered Bonds	Spread	Relief vs. Corporate Bonds	-
Infrastructure Foreign Capital (leverage)	Spread	Relief vs. Corporate Bonds	-

Source: Deloitte

Policy Incentives

Subsidies for renewables

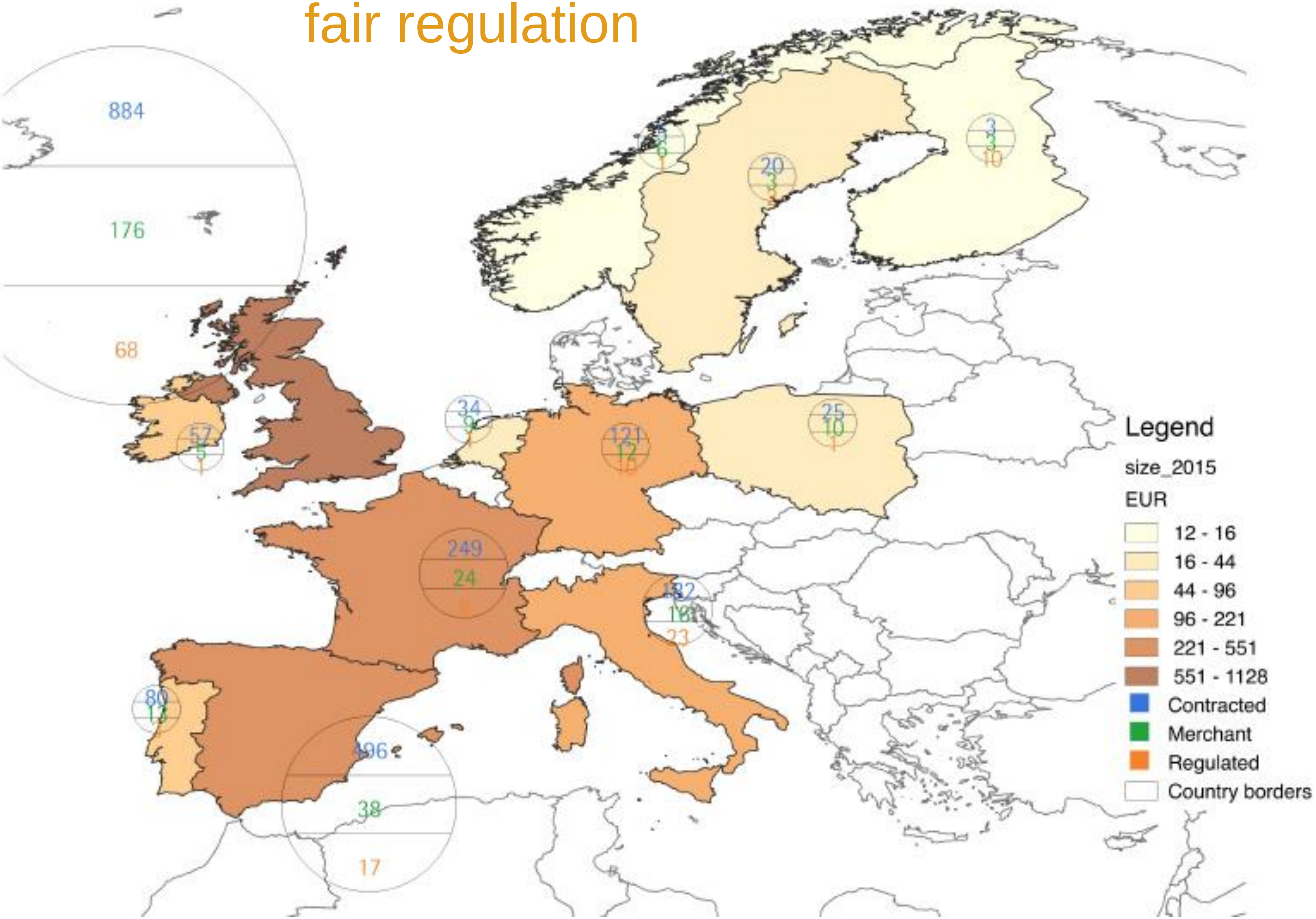
Crowding in private capital

TIFIA program (US)

Trump's plan on tax credits

Juncker plan (Europe)

Performance data is key to enabling fair regulation



J.P. Morgan Asset Management – Global Real Assets Omni

Real Assets Portfolio Construction | 24th March 2017

Finding Synergies between Property and Infrastructure Research:

Society of Property Researchers and the Long-Term Infrastructure Investors Association

Bernie McNamara, Head of Global Real Assets Investment Solutions

Pulkit Sharma, CFA, CAIA, Head of Global Portfolio Construction for Real Assets

J.P.Morgan Asset Management

Global Real Assets Omni Investment Solutions

Bringing the pieces of the real assets puzzle together

- ✓ Part of $95 Billion J.P. Morgan Global Real Assets business
- ✓ Platform for working with investors to build diversified portfolios across real estate and other real assets strategies
- ✓ Targeted to investors' individual needs and risk/return objectives
- ✓ Collaborative research and data-sharing through cross-firm Omni Quantitative Group

Goal is to bring more science and less art to the real asset portfolio construction process

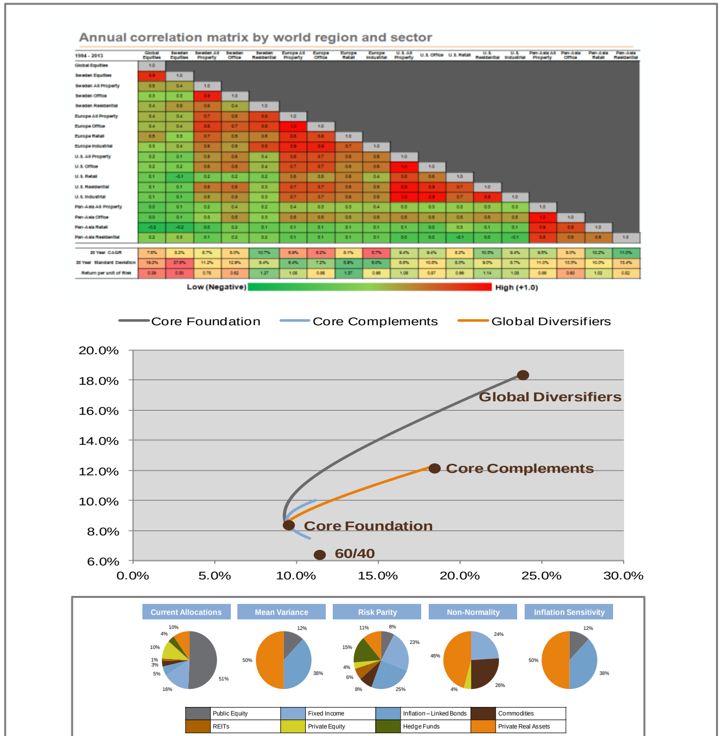
J.P.Morgan Asset Management

More science, less art: enhanced data, tools and transparency for portfolio construction

- **Omni Returns Database**
  - US Core/Core+ RE – NCREIF ODCE
  - US VA/Opp RE – NCREIF/Cambridge
  - US Real Estate Mezzanine – JPMAM-GRA
  - European Core RE – IPD/CBRE/JPMAM-GRA
  - European Non-Core RE – IPD/CBRE/JPMAM-GRA
  - Asia Core Real Estate – JLL/IPD/JPMAM-GRA
  - Asia Non-Core Real Estate – JLL/IPD/JPMAM-GRA
  - REITs – FTSE EPRA/NAREIT
  - OECD Infrastructure – JPMAM-GRA
  - Asian Infrastructure – UBS/JPMAM-GRA
  - Global Transport – Clarkson Research/JPMAM-GRA
  - Timber and Farmland – NCREIF
  - Other real assets
  - 20+ years of consistent data for 200+ time series across styles, sectors and regions

- **Omni Allocation Modeling Tools**
  - Proprietary, customized tools for real asset allocations
  - Mean variance, risk parity, passive market frameworks
  - Inflation sensitivity, non-normal, downside risk models
  - Country, currency, and other bespoke models

Omni Portfolio Construction Frameworks

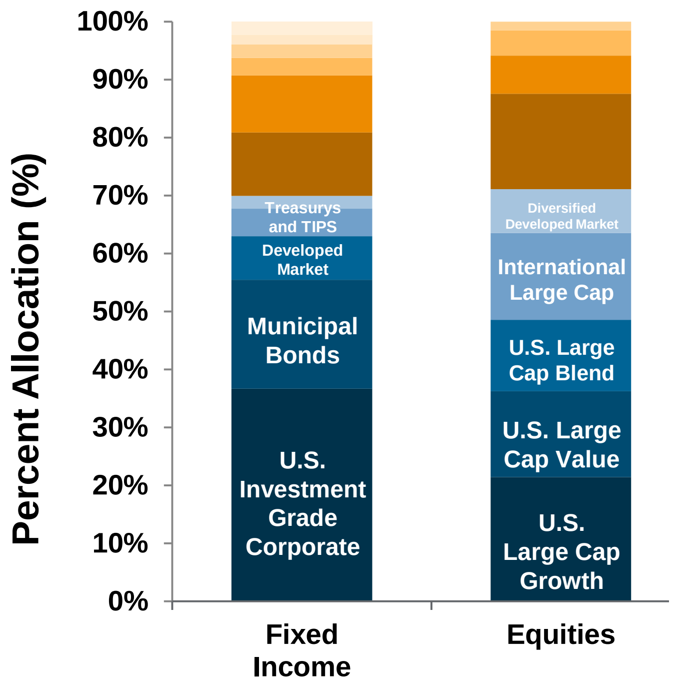


Expected Return	7.4%	8.0%	5.7%	8.0%	8.0%
Historical Volatility	15.2%	8.3%	7.9%	10.2%	8.3%
Equity Correlation	0.98	0.60	0.79	0.58	0.60
CVAR	22%	16%	18%	11%	19%
Probability < CPI	38%	27%	37%	31%	27%
Max Allocation	EQUITIES	REAL ASSETS	FIXED INCOME	REAL ASSETS	REAL ASSETS
Major Exclusions	N/A	PE, HEDGE FUNDS	N/A	EQUITIES, HEDGE FUNDS	PE, HEDGE FUNDS
Key Considerations	UNDERPERFORMANCE EQUITY RISK	INVESTMENT CAPACITY	UNDERPERFORMANCE	INVESTMENT CAPACITY	INVESTMENT CAPACITY

Notes: RE = Real Estate, NCREIF = National Council of Real Estate investment Fiduciaries, ODCE = Open End Diversified Core Equity, IPD = Investment Property Databank, CBRE = CB Richard Ellis, JLL = Jones Lang LaSalle FTSE = Financial Times Stock Exchange, EPRA = European Public Real Estate Association, NAREIT = National Association of Real Estate Investment Trusts, UBS = Union Bank of Switzerland. For illustrative purposes only.

History lesson #1: determining the long-term strategic mix of core vs. non-core within real assets

Fixed income and equities investment universe by style (core and non-core)

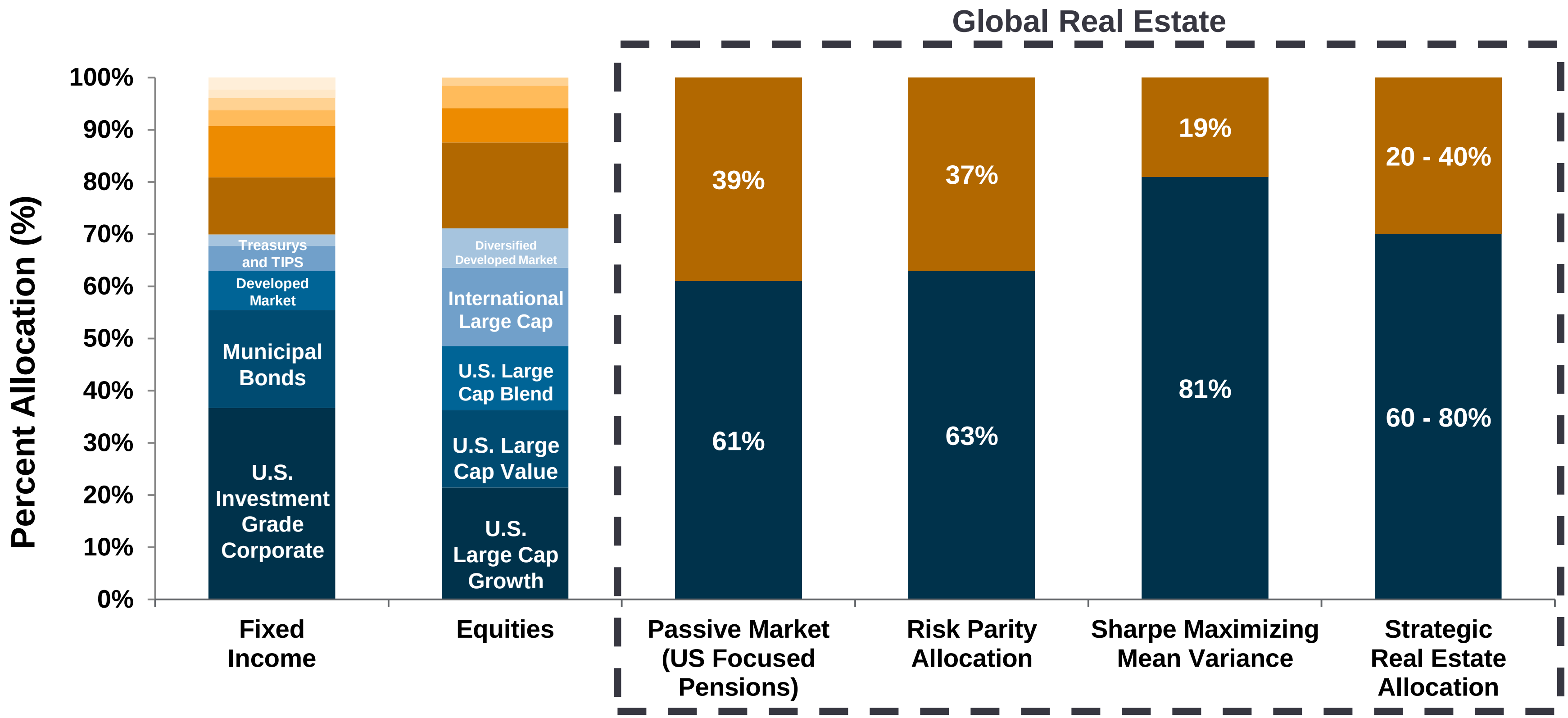


Sources: Morningstar, NCREIF, Kingsley Associates, and IREI. Notes: The passive market allocation is sourced from the 2015 Institutional Real Estate Trends Survey 2015 conducted by the Kingsley Associates and IREI – the survey tracks responses of 86 institutional investors, of which 62 are U.S. tax-exempt institutions.

The allocation represents the real estate passive market targets in private market core and non core real estate exclusive of foreign real estate and REITs. Data Source: NCREIF-ODCE, NCREIF-Townsend, JPMAM Global Real Assets Research. Note the risk parity and mean variance frameworks are analyzed on 20 year (1995-2014) annual historical data for consistency purposes. For discussion purposes only.

History lesson #1: determining the long-term strategic mix of core vs. non-core within real assets

Fixed income, equities, and real estate investment universe by style (core and non-core)



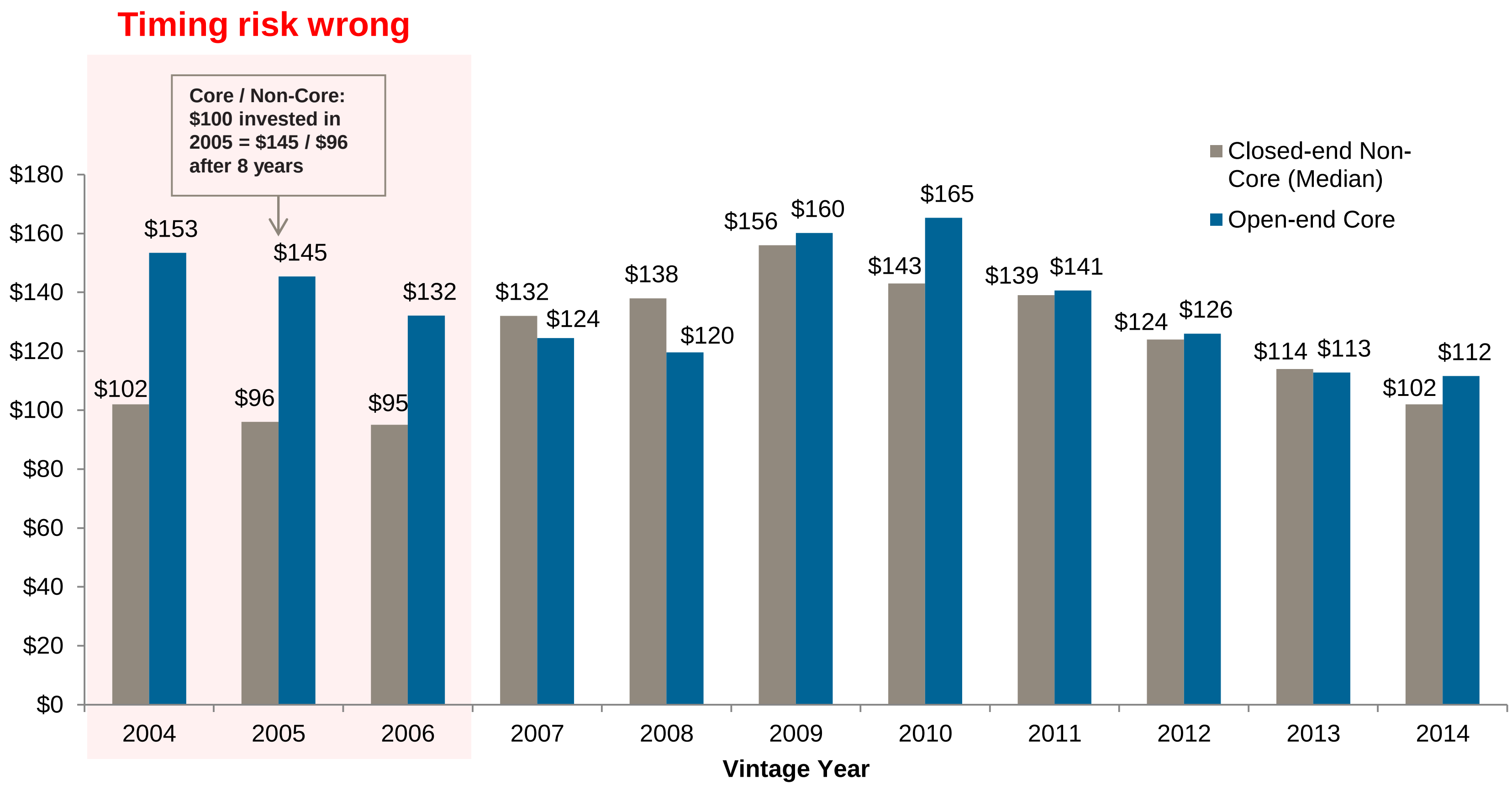
Various asset allocation frameworks point to a core real estate allocation in the range of 60-80%

Sources: Morningstar, NCREIF, Kingsley Associates, and IREI. Notes: The passive market allocation is sourced from the 2015 Institutional Real Estate Trends Survey 2015 conducted by the Kingsley Associates and IREI – the survey tracks responses of 86 institutional investors, of which 62 are U.S. tax-exempt institutions.

The allocation represents the real estate passive market targets in private market core and non core real estate exclusive of foreign real estate and REITs. Data Source: NCREIF-ODCE, NCREIF-Townsend, JPMAM Global Real Assets Research. Note the risk parity and mean variance frameworks are analyzed on 20 year (1995-2014) annual historical data for consistency purposes. For discussion purposes only.

History lesson #2: but what about the short-term?

How much money would a $100 investment be worth over the course of an average fund's life (8 years) if invested in a high-risk closed-end fund vs. a core fund in any given year?



Sources: Cambridge Associates, NCREIF; as of 2016Q3. Returns are net time weighted returns. The closed-end fund performance is representative of a median manager. The above table is for illustrative and discussion purposes only. Past performance is not indicative of future results.

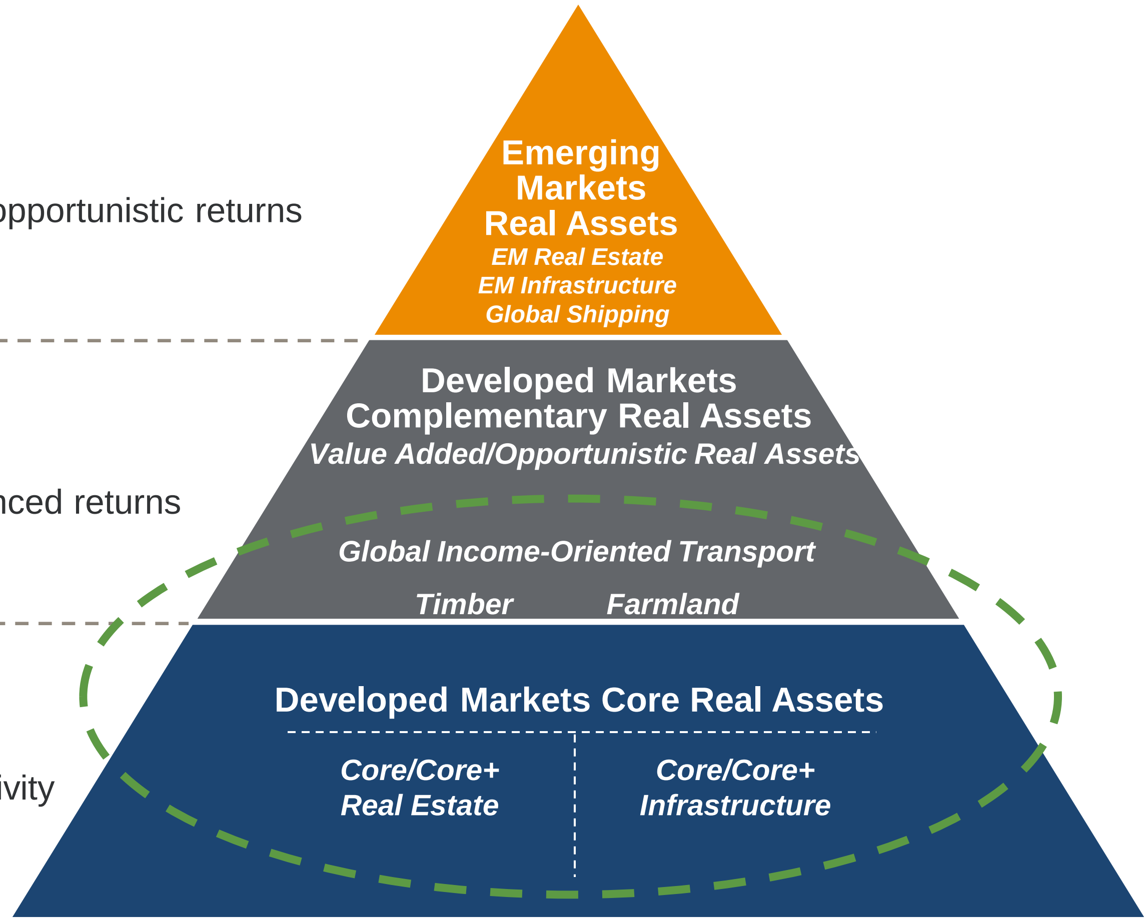
Focus on foundational real asset strategies for scale, stability and long-term exposure

The Real Assets Solutions Pyramid: the role of different real asset categories

GLOBAL DIVERSIFIERS
Global diversification and tactical/opportunistic returns

CORE COMPLEMENTS
Added diversification and/or enhanced returns

CORE FOUNDATION
Stable income with lower volatility, diversification, plus inflation sensitivity



Source: J.P. Morgan Asset Management – Global Real Assets.

Broader is better: double diversification benefits unique to real assets

Low correlations vs. financial assets and between real asset categories

	1996 - 2015	Global Equities	Global Bonds	Private Equity	Hedge Funds	U.S. Core/Core+ Real Estate	Europe Core Real Estate	APAC Core Real Estate	OECD Core/Core+ Infra	Global Transport	All-Tranche REITs	Asian Infra
Financial Assets	Global Equities	1.0										
	Global Bonds	0.0	1.0									
Other Alts	Private Equity	0.7	-0.3	1.0								
	Hedge Funds	0.7	-0.3	0.8	1.0							
Global Real Estate	U.S. Core/Core+ Real Estate	0.2	-0.3	0.4	0.3	1.0						
	Europe Core Real Estate	0.4	-0.4	0.5	0.4	0.7	1.0					
	APAC Core Real Estate	0.2	-0.3	0.4	0.3	0.6	0.6	1.0				
Other Real Assets	OECD Core/Core+ Infrastructure	0.0	0.4	-0.1	0.1	0.2	0.1	-0.3	1.0			
	Global Transport	0.1	0.1	0.0	0.0	0.6	0.3	0.5	0.4	1.0		
	All-Tranche REITs	0.4	0.1	0.2	0.5	-0.1	0.3	0.1	0.2	0.1	1.0	
	Asian Infrastructure	0.0	0.1	0.0	0.2	0.2	0.3	0.5	0.3	0.5	0.6	1.0

Low (Negative) — **High (+1.0)**

Sources: Bloomberg, MSCI, Barclays Capital, HFRI, Burgiss Private Equity, NCREIF, IPD, CBRE, Jones Lang LaSalle, Wilshire, Wells Fargo, UBS, Clarksons Shipping Research, and JPMAM-Global Real Assets Research. Europe and Asia data is denominated in local currency. All other data is denominated is in USD. Annual data as of December 2015. Note: Unlevered real estate series were levered to reflect how institutional investors typically access the representative asset classes. Past performance is not indicative of future results. Diversification does not guarantee investment returns and does not eliminate the risk of loss. The above table is for illustrative and discussion purposes only.

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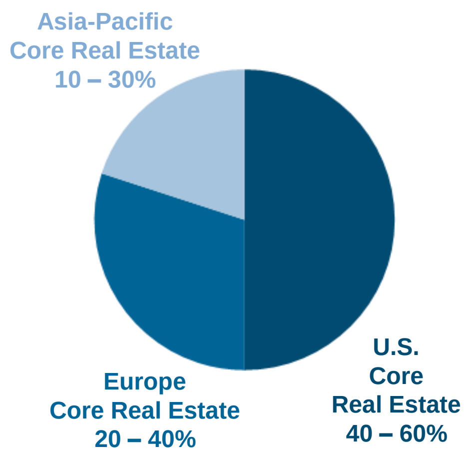
Global Core Real Assets Solutions: building the “Agg” of real estate/real assets

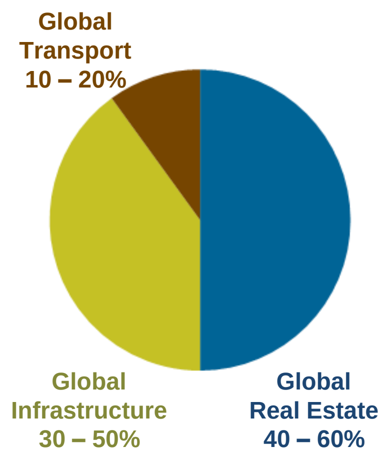
Illustrative portfolio

Global Core Solutions

Global Core Real Estate



Global Core Real Assets



	Global Core Real Estate	Global Core Real Assets
Target Total Return[1]:	7 – 9%	8 – 10%
Target Income Return[1]:	4.5 – 5.5%	5 – 6%
Sector:	Real Estate	Diversified
Exposure:	Global	Global

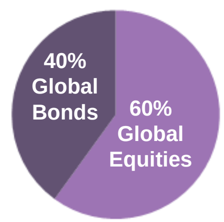
Vs. a 60/40 stock/bond portfolio…

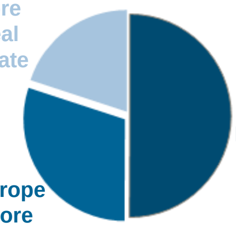
- ✓ **2 – 3X more income**
- ✓ **200 – 300 bps return premium**
- ✓ **20 – 40% lower volatility**
- ✓ **Low equity beta and no duration risk**
- ✓ **Better downside resilience and inflation sensitivity**

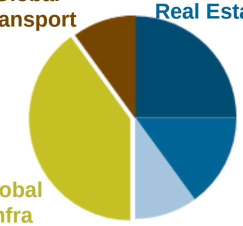
For discussion purposes only. [1]The target returns are gross returns for illustrative purposes only and are subject to significant limitations. An investor should not expect to achieve actual returns similar to the target returns shown above. Because of the inherent limitations of the target returns, potential investors should not rely on them when making a decision on whether or not to invest in the strategy. Please see the complete Target Return disclosure at the conclusion of the presentation for more information on the risks and limitation of target returns.

Better diversification, enhanced income and return potential, and increased overall risk-adjusted returns from diversified real assets allocations

	Global 60/40% Stock/Bond Portfolio	100% UK Real Estate Portfolio	Global Real Estate Portfolio		Global Real Assets Portfolio	







Target Return Characteristics

	Global 60/40% Stock/Bond Portfolio	100% UK Real Estate Portfolio	Global Real Estate Portfolio	vs. 60/40	Global Real Assets Portfolio	vs. GRE
Target Total Return (Gross)*	5 – 7%	6 – 8%	7 – 9%	↑	8 – 10%	↑
Target Income Return*	1.5 – 2.5%	4 – 5%	4.5 – 5.5%	↑	5 – 6%	↑

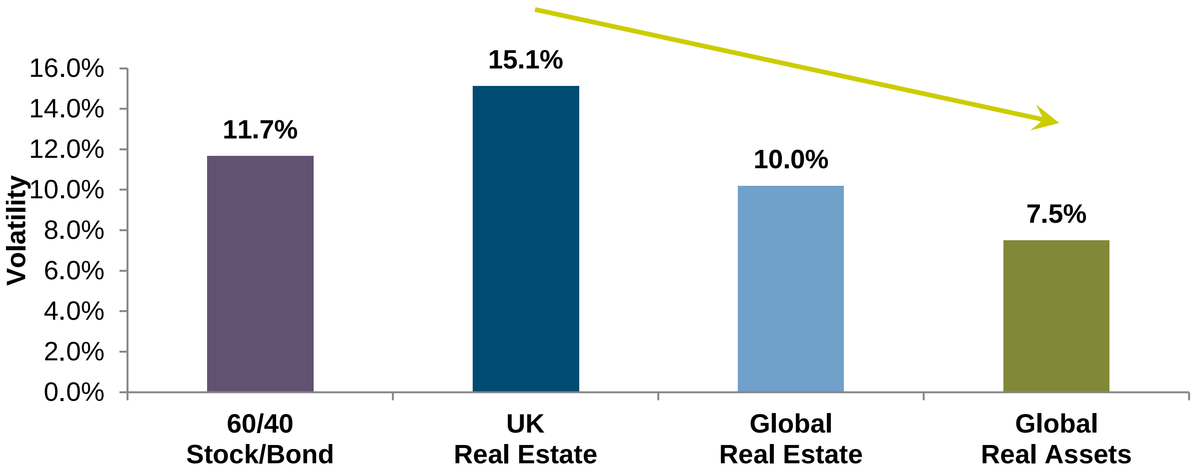
Historical Risk/Return Characteristics

	Global 60/40% Stock/Bond Portfolio	100% UK Real Estate Portfolio	Global Real Estate Portfolio	vs. 60/40	Global Real Assets Portfolio	vs. GRE
Historical Return	6.3%	8.2%	9.1%	↑	9.3%	↑
Historical Volatility	11.7%	15.1%	10.0%	↓	7.5%	↓
Return per unit of Risk	0.5	0.5	0.9	↑	1.2	↑
Max Drawdown	-22%	-37%	-27%	↑	-19%	↓
Equity Beta (vs. MSCI World)	0.6	0.4	0.1	↓	0.1	↓
% of Time Over CPI + 5%	61%	67%	72%	↑	78%	↑

Illustrative 20-year analysis using asset class data. Notes: (1) The target returns are derived from J.P. Morgan internal estimates of respective asset class returns. (2) Return per unit of risk is calculated by dividing the 20-year CAGR by the 20-year standard deviation. (3) Volatility is calculated using historical annual 1996-2015 standard deviation of historical returns. (4) The risk-return characteristics are calculated in USD except for Europe real estate, which is calculated in euros, and APAC real estate and OECD Infrastructure, which are calculated in local currency terms. (5) The portfolio attributes stated in the above table are for illustrative purposes only. (6) The portfolios assume annual rebalancing. (7) The max drawdown denotes the maximum historical peak to trough decline in asset values. (8) % of time over CPI + 5% is calculated using 3-year rolling returns using Euro Area CPI from IMF. Sources: Bloomberg, MSCI, Barclays, NCREIF, CBRE, IPD, Jones Lang LaSalle, Clarksons, IMF, and JPMAM Global Real Assets Research. DISCLAIMER: Past performance is not indicative of future results. Diversification does not guarantee investment returns and does not eliminate the risk of loss. J.P. Morgan seeks to achieve the stated objectives, but there can be no guarantee the objectives will be met. For discussion purposes only.

*The target returns are gross returns for illustrative purposes only and are subject to significant limitations. An investor should not expect to achieve actual returns similar to the target returns shown above. Because of the inherent limitations of the target returns, potential investors should not rely on them when making a decision on whether or not to invest in the strategy. Please see the complete Target Return disclosure at the conclusion of the presentation for more information on the risks and limitation of target returns.

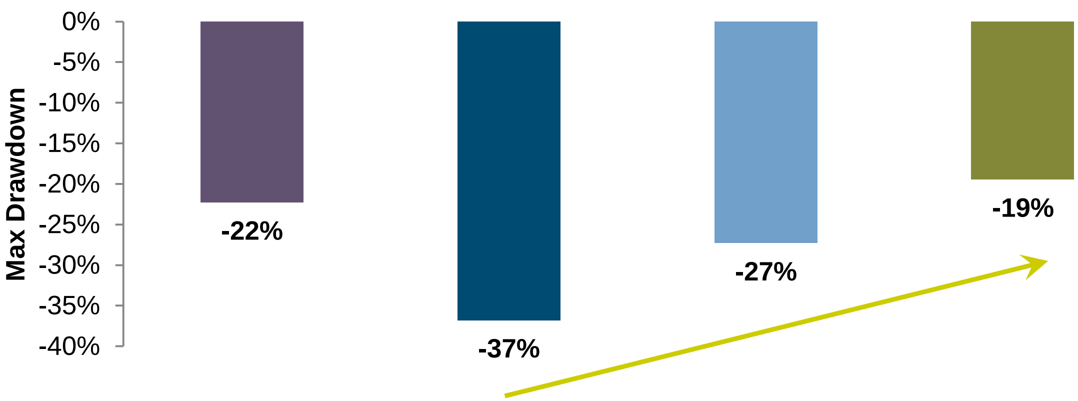
Strategic risk management: significantly lower probability of bad outcomes



Global Real Assets

Volatility Reduction (bps) vs. 60/40

UK Real Estate	Global Real Estate	Global Real Assets
-340	170	***420***



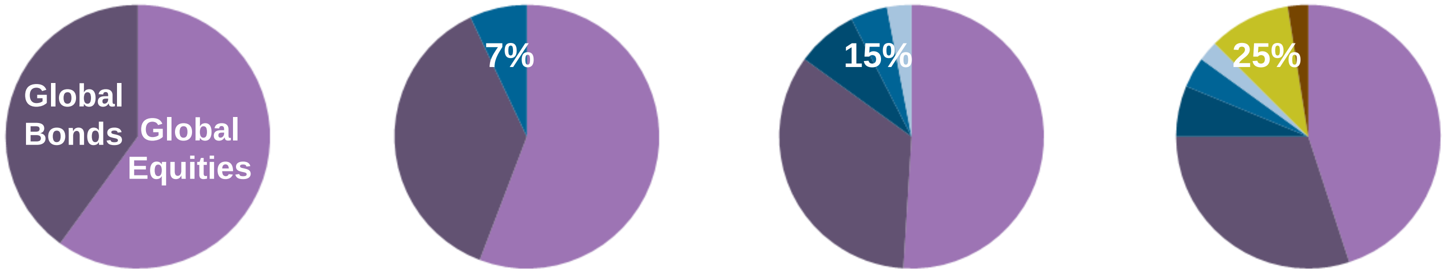
Max Drawdown vs. 60/40 (Worse/Better)

UK Real Estate	Global Real Estate	Global Real Assets
-15%	-5%	***+3%***

Illustrative 20-year analysis using asset class data. Notes: 60/40 denotes a 60% Global Equities (MSCI World) and 40% Fixed Income (Barclays Aggregate) portfolio. Volatility is calculated using historical consistent time-weighted 20-year (1996-2015) data in order to capture long-term multi-cycle “asset class” behavior and is computed in annual terms to mitigate/minimize the impact of serial correlations inherent in private market returns. Max Drawdown denotes to maximum historical peak to trough decline in asset values. Volatility reduction and drawdown reduction tables have the figures rounded for simplicity purposes with the goal of illustrating directional and not absolute inferences. The portfolios assume annual rebalancing. Sources: Bloomberg, MSCI, Barclays, NCREIF, CBRE, IPD, Jones Lang LaSalle, Clarksons, and JPMAM Global Real Assets Research. DISCLAIMER: Past performance is not indicative of future results. Diversification does not guarantee investment returns and does not eliminate the risk of loss. J.P. Morgan seeks to achieve the stated objectives, but there can be no guarantee the objectives will be met. For discussion purposes only.

Diversified and *diversifying*: the overall portfolio context

Traditional Portfolio	+ UK Core Real Estate	+ Global Core Real Estate	+ Global Core Real Assets



Return	**6.3%**	**6.5%**	**6.8%**	**7.2%**
Volatility	**11.7%**	**11.4%**	**10.3%**	**9.3%**
Return/Volatility	**0.54**	**0.57**	**0.66**	**0.77**
Drawdown	**-22%**	**-23%**	**-21%**	**-19%**
Equity Beta	**0.60**	**0.59**	**0.53**	**0.47**

Notes: (1) The return ranges are derived from J.P. Morgan Asset Management – GRA's internal estimates by the investment teams for each of the respective strategies. (2) The portfolio attributes stated in the above table are estimates within ranges and are for illustration purpose only. (3) Volatility is calculated using historical annual 1996-2015 standard deviation of historical returns. (4) Portfolios assumes annual re-balancing. (5) Data is as of December 2015. Sources: NCREIF, IPD, CBRE, INREV, FTSE/EPRA NAREIT, UBS, Clarkson Research, and JPMAM GRA Research. DISCLAIMER: Past performance is not indicative of future results. Diversification does not guarantee investment returns and does not eliminate the risk of loss. J.P. Morgan seeks to achieve the stated objectives, but there can be no guarantee the objectives will be met. For discussion purpose only. This information is not intended as a recommendation to invest in any particular asset class or strategy or as a promise of future performance. References to future returns are not promises or even estimates of actual returns a client portfolio may achieve. Assumptions, opinions and estimates are provided for illustrative purposes only. They should not be relied upon as recommendations to buy or sell securities. Forecasts of financial market trends that are based on current market conditions constitute our judgment and are subject to change without notice. We believe the information provided here is reliable, but do not warrant its accuracy or completeness. This material has been prepared for information purposes only and is not intended to provide, and should not be relied on for accounting, and legal or tax advice.

Appendix

Disclosures

Risk Factors

The following summarises certain key risk factors, as will be set out, along with other risk factors that pertain to the various real assets strategies detailed/mentioned in this presentation. Prospective investors should carefully consider the summaries below in conjunction with the risk factors sections of each of the Fund's Memorandum and relevant Feeder Memorandum and should consult with their own financial, legal and tax advisers before deciding whether to invest in the Funds or any Feeder Vehicle with respect thereto. Some of the risk factors outlined below may not be applicable to all of the Funds in this presentation. For complete information on the risks associated with a particular Fund or Feeder Entity, please refer to the Offering Memorandum for that respective Fund.

General: There can be no assurance that any Fund or the GRA – Omni Program will succeed in meeting its investment objective or target return or that there will be any return on capital or of the original capital invested. Investors will only have recourse for any losses suffered to the assets of the particular Sub-fund in which they invest.

Risks Relating to the Fund's Investment Objective and Investment Strategy. An Investment in the GRA – Omni Program or any underlying Fund is not a bank deposit, is not insured by the U.S. Federal Deposit Insurance Corporation, and is not the obligation of, or guaranteed by, JPMIM, JPMorgan Chase Bank, N.A. or any of their affiliates. An Investment in the Fund involves investment risks, including the possible loss of the principal amount invested.

There can be no assurance that a Fund will achieve this Investment Objective. Although the Investment Adviser will endeavor to recommend Investments that are consistent with the Investment Objective, investments in real estate and real estate-related assets involve an inherently greater risk of loss of capital than various other types of investments, due in large part to the risk factors set forth in this Booklet and in Section V of the Memorandum. Therefore, prospective investors must recognize that, notwithstanding the Investment Objective, the Fund may be unable to preserve an Investor's capital through its program of investments in real estate.

Lack of liquidity: Interests in the GRA – Omni Program or any Fund and each Feeder Entity will not be transferable except with the consent of the Management Company, which consent may be withheld in its absolute discretion. Investors may not withdraw capital from the Fund or any Feeder Entity once they have invested, except by submitting a repurchase request. Repurchase requests will, however, only be met at the absolute discretion of the Management Company. Accordingly, investors in the Fund or a Feeder Entity will have no right to have their interests repurchased. Investor's may be required to bear the financial risk of their investment in the Fund or a Feeder Entity for an indefinite period of time. If an investors interest is repurchased or transferred within the first three years following the acceptance of the investor into the Fund or any Feeder Entity, a Repurchase Fee will be payable. The repurchase feature differs for each Fund.

Leverage: The use of borrowing by a Fund and/or the Feeder Entities may create greater potential for loss as the available assets of the Fund and Feeder Entities may be insufficient to meet repayments and a Fund and Feeder Entities may not be able to refinance existing borrowing on equal terms or at all.

Distributions: An investor will only receive cash distributions from a Fund or Feeder Entity in which it is invested if it elects to do so. If an investor does not so elect, distributions will be reinvested on its behalf in the Fund or Feeder Entity, as the case may be. However, tax may still be payable by the investor on such re-invested distributions. Distributable cash flow will be accumulated in relation to any accumulation units issued.

Risks associated with real estate and infrastructure investments: An investment in the GRA – Omni Program or any Fund or a Feeder Entity will be subject to certain risks associated with the ownership of real estate and infrastructure related investments. These risks include, among others, adverse changes to national or international economic conditions; increase in competition; changes in interest rates, property taxes and other operating expenses; legal fees and expenses incurred to protect the Fund's investments; changes in planning laws and other governmental rules and fiscal policies; casualty or condemnation losses; uninsured damages from natural disasters and acts of terrorism and limitations on and variations in rents. These factors could give rise to fluctuations in occupancy rates, rent schedules or operating expenses. In addition, investments in real estate and infrastructure tend to be long-term and illiquid. The Fund may also invest in real estate and infrastructure related securities and other real estate-related investments, which will involve risks in addition to those set out above.

Risks to Returns from Real Estate Investments Other than Properties. A Fund may invest in investments other than direct real estate investments. The performance of those investments will be inherently linked to the value of the real estate from which they derive their inherent value. Accordingly, all of the risks which apply in respect of direct real estate described above and are further be described in that Fund's Memorandum will, to varying degrees, impact on the value of any other investments the Fund makes.

Environmental risks: The Funds may become liable for substantial costs arising from remedying environmental problems associated with the properties it holds. The costs of any such remediation may exceed the value of the relevant property and/or the aggregate assets of the Fund. Environmental problems may also affect the use and operation of such properties.

Currency risk and hedging: The base currency may vary for select Funds; refer to the respective Fund's Memorandum. Investors may be subject to fluctuations in currency exchange rates. Some Funds may enter into transactions to hedge currency risk. However, there can be no assurance that such hedging techniques will be successful.

Diversification: A possible limited degree of diversification means the performance of a Fund may be more susceptible to a single economic, political or social event. The GRA – Omni Program does not guarantee diversification protection.

Changes in Tax Regimes: Changes in tax legislation, administrative practices or understandings in any of the countries in which a Fund invests or in which the investor resides, or changes in tax treaties negotiated by those countries, could adversely affect the returns from that Fund.

Risk Factors continued

Lack of operating history: A Fund and Feeder Entities, when formed, will have no operating history. The past performance of other investments made by J.P. Morgan Asset Management or its affiliates are not an indication of the future results of an investment in that Fund or Feeder Entities.

Conflicts of interest: JPMorgan Chase & Co. engages in activities in the normal course of its investment banking, asset management and other businesses that may conflict with the interests of any Fund, the Feeder Entities and/or their respective investors.

Highly Volatile Markets: The prices of securities and commodities contracts and all derivative instruments, including futures and options, can be highly volatile. Price movements of forward, futures and other derivative contracts in which an Underlying Investment's assets may be invested are influenced by, among other things, interest rates, changing supply and demand relationships, trade, fiscal, monetary and exchange control programs and policies of governments, and national and international political and economic events and policies. An Underlying Investment also is subject to the risk of the failure of any exchanges on which its positions trade or of their clearinghouses.

Risks Associated with Investments in Maritime Assets Generally: An investment in the Strategy is subject to certain risks associated with the ownership of maritime assets and the maritime industry in general, including: the burdens of ownership of maritime-related assets; local, national and international economic conditions; the supply and demand for assets; the financial condition of operators, buyers and sellers of assets; changes in interest rates and the availability of credit which may render the sale or refinancing of assets difficult or impracticable; changes in environmental laws and regulations, planning laws and other governmental rules and fiscal and monetary policies; environmental claims arising in respect of assets acquired with undisclosed or unknown defects or problems resulting in environmental liabilities or as to which inadequate reserves have been established; changes in tax rates; changes in energy prices; negative developments in the economy that depress commercial transportation activity; uninsured casualties; force majeure acts, terrorist and piracy events, under-insured or uninsurable losses; and other factors which are beyond the reasonable control of the Strategy and the Investment Adviser. In addition, as recent experience has demonstrated, maritime assets are subject to long-term cyclical trends that give rise to significant volatility in values.

Risks of Fund of Funds Structure: Although J.P. Morgan Investment Management will receive information from each Underlying Investment regarding its investment performance and investment strategy, J.P. Morgan Investment Management may have little or no means of independently verifying this information. An Underlying Investment may use proprietary investment strategies that are not fully disclosed to JPMIM, which may involve risks under some market conditions that are not anticipated by J.P. Morgan Investment Management . The performance of the Fund and the Master Fund depends on the success of J.P. Morgan Investment Management in selecting Underlying Investments for investment by the Fund and the Master Fund and the allocation and reallocation of Fund's and the Master Fund's assets among those Underlying Investments. Past results of portfolio managers selected by JPMIM are not necessarily indicative of future performance. No assurance can be made that profits will be achieved or that substantial losses will not be incurred. Investment decisions of the Underlying Investment are made by the portfolio managers independently of each other so that, at any particular time, one Underlying Investment may be purchasing shares of an issuer whose shares are being sold at the same time by another Underlying Investment.

A Fund or a Master Fund may not be able to withdraw from an investment fund except at certain designated times, limiting the ability of J.P. Morgan Investment Management to withdraw assets from an investment fund that may have poor performance or for other reasons. Although a Fund and a Master Fund may invest in investment funds managed by affiliated portfolio managers, such managers owe a duty to their respective investment funds, not the Fund and the Master Fund. An affiliated portfolio manager may not allow the Fund or the Master Fund to withdraw from an Investment Fund if it determines that a withdrawal would not be in the best interests of the investment fund. Certain investment vehicles will have the right to automatically redeem part of the Fund's or the Master Fund's interest in such investment vehicles in the event that the Fund's or the Master Fund's interest exceeds a specified percentage. Such redemptions may occur without notice.

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