Real estate and infrastructure: The same, but different

AXA IM – Real Assets, Research & Strategy

March 2017

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Focus

- Drivers of 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?

Real estate returns largely driven by economic growth

Source: Macrobond, MSCI (data as at 19 January 2017)
Relationship between economy and real estate extends to occupier fundamentals

U.S: Tenant Demand Linked to Labour Market

- United States Unemployment
- US Vacancy Rate

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

Europe: Tenant Demand Linked to Labour Market

- EU 28 Unemployment
- Europe Office Vacancy Rate

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.
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)

<table>
<thead>
<tr>
<th>City</th>
<th>Performance relative to U.S. exc. Top 25 markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>New York</td>
<td>43%</td>
</tr>
<tr>
<td>San Francisco</td>
<td>39%</td>
</tr>
<tr>
<td>Washington, DC</td>
<td>33%</td>
</tr>
<tr>
<td>Boston</td>
<td>31%</td>
</tr>
<tr>
<td>Seattle</td>
<td>22%</td>
</tr>
<tr>
<td>Los Angeles</td>
<td>14%</td>
</tr>
<tr>
<td>Chicago</td>
<td>8%</td>
</tr>
</tbody>
</table>

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

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.

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

<table>
<thead>
<tr>
<th>City</th>
<th>Performance relative to U.S. exc. Top 25 markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>London vs</td>
<td>66%</td>
</tr>
<tr>
<td>Amsterdam vs</td>
<td>23%</td>
</tr>
<tr>
<td>Paris vs</td>
<td>20%</td>
</tr>
<tr>
<td>Munich vs</td>
<td>18%</td>
</tr>
<tr>
<td>Hamburg vs</td>
<td>10%</td>
</tr>
<tr>
<td>Stockholm vs</td>
<td>9%</td>
</tr>
<tr>
<td>Madrid vs</td>
<td>8%</td>
</tr>
<tr>
<td>Milan vs</td>
<td>-3%</td>
</tr>
<tr>
<td>Berlin vs</td>
<td>-4%</td>
</tr>
<tr>
<td>Frankfurt vs</td>
<td>-9%</td>
</tr>
</tbody>
</table>

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

Performance relative to U.S. exc. Top 25 markets
Continual investment required in real estate and infrastructure stock

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

Long-Term Average

London City Supply Pipeline

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

Much more difficult (but not impossible) to over-supply infrastructure assets
Significant increase in infrastructure investment needed: Private sector has an important role to play

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

Data at 2015 prices
Water: abundant source but limited availability – demand tied to industrial growth in Western economies

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

Water resources: stable and abundant but relatively inaccessible and under pressure

- Salt water: 97%
- Fresh water: 3%
- Ice and glaciers: 74.9%
- Underground water: 24.5%
- Surface water / other: 1.3%
- Lakes: 98.7%
- Streams and rivers: 1.3%

Industrial demand for water in US and Europe generally outstrips other use

- Domestic
- Industrial
- Agriculture

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
Transport: networks must evolve along with shifts in demand

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

International Arrivals Into Australia

Vehicle fleet in developed countries has seen low or no growth - Asia Pacific the source of global demand

New Zealand

UK

U.S.

China

China becoming major tourism source

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

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

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

Important Notice: The information has been established on the basis of data, projections, forecasts, anticipations and hypotheses which are subjective. This analysis and conclusions are the expression of an opinion, based on available data at a specific date. Due to the subjective aspect of these analyses, the effective evolution of the economic variables and values of the financial markets could be significantly different from the projections, forecast, anticipations and hypotheses which are communicated in this overview. For illustrative purposes only. There can be no guarantee that any investment strategy presented will be implemented or ultimately be successful.
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***)

Data generated by driverless cars could dwarf that from other sources

* 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

Please refer to the important notice on slide 10
The above list is illustrative, indicative only and is neither detailed nor exhaustive
Energy generation composition is evolving fast, particularly in Europe, as economies decarbonise.

European capacity 2005: 676GW
- Wind: 6%
- Solar PV: 0.3%
- Natural Gas: 20%
- Coal: 25%
- Nuclear: 19%
- Fuel Oil: 8%
- Large Hydro: 18%
- Other: 4%

European capacity 2016: 918GW
- Wind: 17%
- Solar PV: 11%
- Natural Gas: 20%
- Coal: 17%
- Nuclear: 13%
- Fuel Oil: 3%
- Large Hydro: 15%
- Other: 4%

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

INVESTMENT MANAGERS
Real estate and infrastructure transactions have followed a similar path 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%)

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

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%*

Low Risk/Return

*Infrastructure Debt*  
*Brownfield Infrastructure*

High Risk/Return

*Greenfield Infrastructure*

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

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)*

Source: AXA IM – Real Assets
*For illustrative purposes only*

Infrastructure has more to offer than just long-term income
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

![Diagram showing the infrastructure universe with categories such as Infra Debt, Infra Equity, Core Infrastructure, Value Added Infrastructure, Opportunistic Infrastructure, and Private Equity. The diagram highlights the relationship between reward and risk with sources cited as CFA, LGIM.](image)
Where Are We Now?
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

- 6

Standard Industry Segments

- 11

Granular Sub-sectors

- 31

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

Lacking 62%

Sufficient 24%

Wholly Inadequate 32%

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**

![Graph showing standard deviation of net IRR and median net IRR for vintage years 2004 to 2013.]

**MSCI Global Infrastructure Index**

![Graphs showing returns for global contracted and uncontracted assets.](source: IPD)

**EDHEC/ LTIIA: Contracted Infrastructure Fund**

**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

• 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

Source: Preqin
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

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

*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
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
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**

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.

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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?

Timing risk wrong

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


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Developed Markets
Core Real Assets

Core/Core+
Real Estate

Core/Core+
Infrastructure

Emerging Markets
Real Assets

EM Real Estate
EM Infrastructure
Global Shipping

Developed Markets
Complementary Real Assets

Value Added/Opportunistic Real Assets

Global Income-Oriented Transport

Timber
Farmland

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

Broader is better: double diversification benefits unique to real assets

Low correlations vs. financial assets and between real asset categories

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

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

**Illustrative portfolio**

**Global Core Solutions**

<table>
<thead>
<tr>
<th>Sector</th>
<th>Exposure</th>
<th>Europe Core Real Estate 20 – 40%</th>
<th>Asia-Pacific Core Real Estate 10 – 30%</th>
<th>U.S. Core Real Estate 40 – 60%</th>
</tr>
</thead>
</table>

**Global Core Real Estate**

- Asia-Pacific Core Real Estate: 10 – 30%
- Europe Core Real Estate: 20 – 40%
- U.S. Core Real Estate: 40 – 60%

**Global Core Real Assets**

- Global Transport: 10 – 20%
- Global Infrastructure: 30 – 50%
- Global Real Estate: 40 – 60%

**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**

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

**Target Return Characteristics**

<table>
<thead>
<tr>
<th></th>
<th>Global 60/40% Stock/Bond Portfolio</th>
<th>100% UK Real Estate Portfolio</th>
<th>Global Real Estate Portfolio</th>
<th>Global Real Assets Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Target Total Return</strong>&lt;sup&gt;<em>(Gross)</em>&lt;/sup&gt;</td>
<td>5 – 7%</td>
<td>6 – 8%</td>
<td>7 – 9%</td>
<td>8 – 10%</td>
</tr>
<tr>
<td><strong>Target Income Return</strong>&lt;sup&gt;*&lt;/sup&gt;</td>
<td>1.5 – 2.5%</td>
<td>4 – 5%</td>
<td>4.5 – 5.5%</td>
<td>5 – 6%</td>
</tr>
</tbody>
</table>

**Historical Risk/Return Characteristics**

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

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 Euro 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.

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Strategic risk management: significantly lower probability of bad outcomes

Volatility Reduction (bps) vs. 60/40

<table>
<thead>
<tr>
<th></th>
<th>UK Real Estate</th>
<th>Global Real Estate</th>
<th>Global Real Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>60/40</td>
<td>-340</td>
<td>170</td>
<td>420</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th></th>
<th>UK Real Estate</th>
<th>Global Real Estate</th>
<th>Global Real Assets</th>
</tr>
</thead>
<tbody>
<tr>
<td>-15%</td>
<td>-5%</td>
<td>+3%</td>
<td></td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Portfolio</th>
<th>Return</th>
<th>Volatility</th>
<th>Return/Volatility</th>
<th>Drawdown</th>
<th>Equity Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Portfolio</td>
<td>6.3%</td>
<td>11.7%</td>
<td>0.54</td>
<td>-22%</td>
<td>0.60</td>
</tr>
<tr>
<td>+ UK Core Real Estate</td>
<td>6.5%</td>
<td>11.4%</td>
<td>0.57</td>
<td>-23%</td>
<td>0.59</td>
</tr>
<tr>
<td>+ Global Core Real Estate</td>
<td>6.8%</td>
<td>10.3%</td>
<td>0.66</td>
<td>-21%</td>
<td>0.53</td>
</tr>
<tr>
<td>+ Global Core Real Assets</td>
<td>7.2%</td>
<td>9.3%</td>
<td>0.77</td>
<td>-19%</td>
<td>0.47</td>
</tr>
</tbody>
</table>

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 in turn 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.

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.
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 uninsured 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.

Absence of Regulatory Oversight: A Fund is not registered as an investment company under the U.S. Investment Company Act of 1940, as amended (the “Investment Company Act”), in reliance upon an exemption available to privately offered investment companies and, accordingly, the provisions of the Investment Company Act (which, among other things, require investment companies to have a majority of disinterested directors, provide limitations on leverage, limit transactions between investment companies and their affiliates and regulate the relationship between the Adviser and the investment company) are not applicable.

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