The Actuarial Profession
making financial sense of the future

Investment Strategy for Pension Actuaries Seminar
11 April 2008, London

The Actuarial Profession
making financial sense of the future

The Case for Infrastructure Investing

The case for Infrastructure Investing

The Actuarial Profession
making financial sense of the future

The Case for Infrastructure Investing

- **The strategic case**
- Risk and return characteristics
- Method of access
- Market conditions

What is infrastructure?

- *Essential facilities and services, upon which the economic productivity of a community depends*
- *Assets involved in the movement of goods, people, water and energy*

Transportation and regulated assets offer the best protection against inflation

Transportation Assets	Regulated Assets	Communications Assets	Social Infrastructure
			
Bridges and tunnels	Electricity transmission	Radio/TV broadcast towers	Schools
Toll roads	Oil and gas pipelines	Wireless towers	Hospitals
Railroads	Electricity and gas distribution	Cable systems	Prisons
Rapid transit links	Water distribution	Satellite networks	Courthouses
Airports, Seaports	Waste water collection and processing systems		

The Actuarial Profession
making financial sense of the future

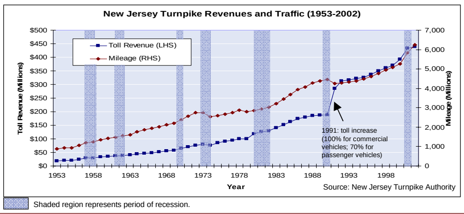
Investment characteristics of core plus infrastructure

- Long-term, **quasi-monopolistic** assets with low risk of obsolescence
  - Stable, predictable cash flows
  - Relatively insensitive to economic cycles
  - Relatively price inelastic
- Potential to achieve **favorable risk-adjusted returns** through the use of leverage
- Real return asset with **inflation-protection**
- **Low correlation** of returns with other asset classes and between infrastructure sub-sectors

The Actuarial Profession
making financial sense of the future

Characteristics of core infrastructure: Toll-road example

- **Revenue growth**: 7% annually for the 50 yr period 1952-2002
- **Low revenue volatility**: 7.9% for 50 years, 4.8% excluding 1991 and 3.1% for the 22yr period ending 2002 (ex 1991)
- **Low usage volatility**: 4.0% for miles driven over the 50yr period, and ~ 3.0% for the 22yr period ending 2002 (ex 1991)
- **Inelastic user demand**: Only a small and temporary decrease in miles driven despite large toll increase in 1991
- **Economic insensitivity**: Minimal and temporary impact of recessions on miles driven
- **Long-term investment**: Characteristics that create an attractive long-term investment suitable for an open-end fund



Shaded region represents period of recession.

The Case for Infrastructure Investing

- The strategic case
- **Risk and return characteristics**
- Method of access
- Market conditions

The Actuarial Profession
making financial sense of the future

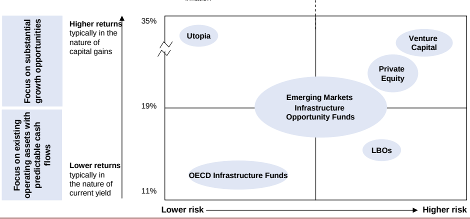
Risk–return profile comparison

Risk Profile - "Infrastructure"

- Relatively immune to global or regional competitive pressures
- High barriers to entry and sustainable presence in the market
- Tangible underlying assets with relatively high predictability of cash flows, i.e. generally stable returns
- Often cash flows/returns linked to inflation

Risk Profile – "Higher risk" (PE/VC and LBO)

- Relatively higher financial risk
- Relatively higher operating risk
- Susceptible to global or regional competitive pressures
- Management risk
- Technology obsolescence



*These returns are for illustrative purposes and do not represent actual returns for the Fund.

The Actuarial Profession
making financial sense of the future

Summary of risks (and mitigating factors) – OECD markets

- Regulatory risk (due diligence and transparent regulatory process)
- Political risk (labor support, enforceable contracts, commercial law)
- Liability issues (insurance and appropriate risk allocation among stakeholders)
- Liquidity
  - Asset liquidity (long-term approach, open ended structure does not force asset sales)
  - Investor liquidity (high cash flowing assets, new investor queue, refinancing)
- Varying sub-sector risks along a spectrum from operating toll roads, water/gas distribution, airports through to development (target well diversified portfolio)
- An emerging investment strategy: inefficiencies, lacking robust data (early investors may benefit from multiple expansion)

The Actuarial Profession
making financial sense of the future

Summary of risks (and mitigating factors) – Emerging Markets

Potential risks	Mitigation strategies
Evolving regulatory and legal environments - Query the enforceability of long-term concessions - Recall Dabhol in India* - Fixed return PRC toll roads	**Invest in sustainable projects** - Low cost producers leading to affordability of services; right solution for need - Minimal adverse social and environmental impact In the Investment Adviser's view, regulation in Asia conducive to investment, borne out of the fact infrastructure is a "need to have" not a "good to have" - Governments eager to promote quality investment - Fund will work to increase its reputation as a desirable partner by establishing a track record of investing in sustainable projects
Construction/project execution - Potential for certain Fund investments to be "greenfield" or early-stage projects	**Fund desirable partners: JPMorgan-brand provides cachet for proven local partners seeking international exposure** Fund to partner with internationally-tested management and teams
Corporate governance The Fund will potentially be investing in young or newly created companies	**Ensure sufficient control in place to install appropriate down-side protection** - Board control/active oversight as appropriate/permitting - Work with proven management teams
Complex local landscapes with cultural and linguistic gaps - Close understanding of regulatory drivers key - Sensitivity to wholly foreign-owned concessions - Skeptical view of some foreign direct investment as "hot money"	**Seek out strong local partners** - Local government JV partners as appropriate/feasible to ensure "buy-in" from government decision makers - Work with proven local management talent

* Dabhol refers to the combined-cycle power plant in India's Maharashtra state. Highly touted by Enron during its inception in 1992, it became the subject of intense controversy in part due to the World Bank's judgment that the project was not "economically viable" and Maharashtra's dispute of a "contracted" tariff that was substantially above market. Enron eventually abandoned the project after its bankruptcy. Dabhol eventually started operation in 2006 under new management.

[1] Infrastructure investments are subject to significant risks and conflicts – see the Memorandum and "Risk factors and important disclaimers" section of this presentation

The Actuarial Profession
making financial sense of the future

A portfolio of infrastructure assets offers diversification benefits

Correlation coefficients of annual EBITDA growth rates (in local currencies), 1986 – 2005

U.S. sub-sectors

	Electric utilities	Gas utilities	Airports	Seaports	Water and sewer
Toll roads	0.03	0.00	0.42	0.09	-0.09
Electric utilities		0.16	0.18	0.01	0.23
Gas utilities			0.05	0.06	0.31
Airports				0.40	-0.03
Seaports					0.12

Sources: JPMorgan, FactSet, FAA, Federal Highway Administration, Maritime Administration, and company websites

European sub-sectors

	Electric utilities	Gas utilities	Airports	Seaports	Water and sewer
Toll roads	0.05	0.26	0.17	-0.36	0.22
Electric utilities		0.39	-0.16	0.15	-0.48
Gas utilities			-0.41	-0.00	-0.29
Airports				0.22	-0.09
Seaports					-0.48

Sources: JPMorgan, FactSet, Eurostat, and company websites

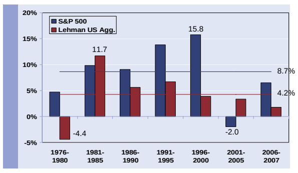
The Actuarial Profession
making financial sense of the future

Long-term core-plus infrastructure returns in perspective

Real Returns

Since 1976:

- S&P 500 real return of 8.7%
- Annual volatility (standard deviation) of those returns was 14.7%
  - Range over distinct 5-year periods was 10.1% (1991-95) to 18.8% (1986-90)
- Lehman Aggregate real return of 4.2%
- Annual volatility of those returns was 5.8%
  - Range over distinct 5-year periods was 3.4% (1996-2000) to 8.5% (1981-85)



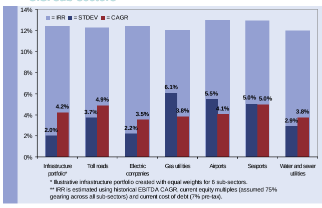
Source: JPMorgan Asset Management

Indices do not include fees or operating expenses and are not available for actual investment. The S&P 500 is an unmanaged broad-based index used as a presentation of the U.S. stock market. It includes 500 widely held common stocks. The Lehman US Aggregate index covers the USD-denominated, investment-grade, fixed-rate, taxable bond market of SEC-registered securities. The index includes bonds from the Treasury, Government-Related, Corporate, MBS (agency fixed-rate and hybrid ARM passthroughs), ABS, and CMBS sectors.

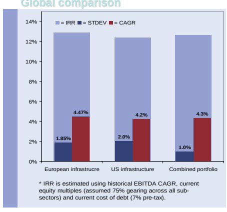
The Actuarial Profession
making financial sense of the future

Low correlations among sub-sectors reduces the volatility of a broadly diversified infrastructure portfolio, 1986 – 2005

U.S. sub-sectors



Global comparison

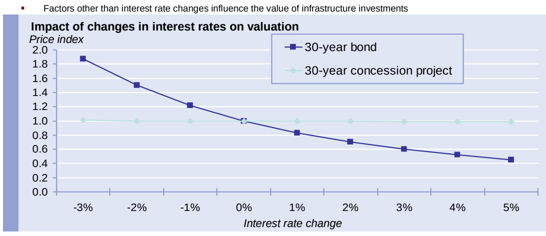


Source: JPMorgan Asset Management.

The Actuarial Profession
making financial sense of the future

Infrastructure is a valuable interest-rate hedge

- We have compared changes in the value of infrastructure assets to the value of a long-term fixed-rate bond in response to changes in interest rates
  - a 30-yr bond shows duration of approximately 15, i.e., a 1% change in yield will result in a 15% change in price
- Contrary to a fixed coupon bond, infrastructure assets with cash flows that adjust for inflation will have a duration approaching zero or even negative duration, allowing them to maintain (or increase in) value
- Factors other than interest rate changes influence the value of infrastructure investments



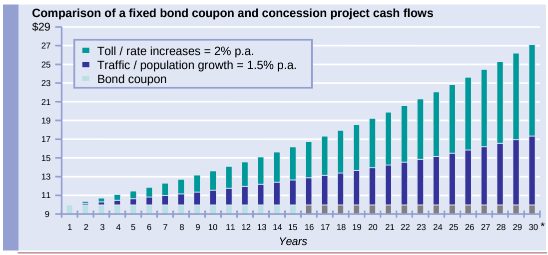
Source: JPMorgan Asset Management

The Actuarial Profession
making financial sense of the future

In contrast to fixed income, infrastructure provides protection against inflation

- A coupon for a fixed rate bond is constant, without inflation-protection characteristics
- Cash flows for an infrastructure concession, however, are not fixed and rise through a combination of increased usage and adjustment for inflation

Comparison of a fixed bond coupon and concession project cash flows



*Note: assumes principal of $100. This illustration is meant to show nominal cash flow over a 30-year period, and does not take into account the principal repayment of the bond in year 30. The chart also does not take into account the assumed zero residual value of the infrastructure concession.

Source: JPMorgan Asset Management

The Actuarial Profession
making financial sense of the future

The Case for Infrastructure Investing

- The strategic case
- Risk and return characteristics
- **Method of access**
- Market conditions

The Actuarial Profession
making financial sense of the future

Fund basics: Open-end vs. closed-end

	Open-end	Closed-end
Term	Perpetual	~10-15 years
Investment Thesis	Mature assets (brownfield) in developed markets	More opportunistic: may look at greenfield projects, developing markets
Risk-Return	Underwriting for modest returns	Targeting higher returns
Source of Returns	Biased towards cash flows	Biased towards capital gains
Asset Disposition	Hold for long run or sell at opportune time	Need to sell assets to unwind fund (regardless of economic environment)
Liquidity to Investors	Liquid with soft lock	Very limited; potentially sell stake to third party
Fees	Asset management fee structure	2 & 20 style plus other fees

The Actuarial Profession
making financial sense of the future

Benefits of perpetual-life strategy and fund structure

Long-term investment strategy

- Offers liquidity and mitigates reinvestment risk to investors.
- Asset exit strategy becomes largely irrelevant. Can opportunistically dispose of assets.
- Good match for investor long-term liabilities.
- Attractive to like-minded partners (e.g., operators, developers, etc.).
- Investment strategy seeks to maximize cash flow over the long-term rather than capital gains over the short/medium term.
- Attractive to governments and regulatory authorities.

The Actuarial Profession
making financial sense of the future

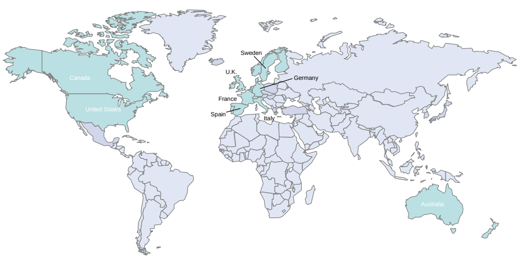
The Case for Infrastructure Investing

- The strategic case
- Risk and return characteristics
- Method of access
- **Market conditions**

The Actuarial Profession
making financial sense of the future

Geographic diversification: OECD vs. Emerging Markets

Major-economy OECD countries



OECD Countries
Emerging Markets

The Actuarial Profession
making financial sense of the future

Contrasting Emerging Markets vs. OECD Markets

	OECD	Emerging Markets
Nature of market	▪ The need for infrastructure is more about maintenance than new build – usage is steady ▪ Developed legal systems and litigation processes ▪ More companies with diverse infrastructure portfolios and large market capitalizations	▪ More infrastructure still needs to be built; usage growing ▪ Less developed legal systems - less litigious environment ▪ Industry consolidation not as advanced as OECD, providing investor friendly to attract capital in certain cases, more optionality on exit

Relative risk	▪ Developed regulated environments
	  ▪ More "merchant" risk and benchmarking competition
	  ▪ Periodic resets
	▪ More "bond-like" returns on core infrastructure
	▪ Deep public capital markets
		▪ Long-term "offtake" contracts still common – PPAs, concessions
		▪ Regulatory environment sound but evolving - generally investor friendly to attract capital
		▪ Higher perceived risk, viewed from OECD perspective
		  ▪ Yields potential for higher returns
		▪ Capital markets still not as liquid as OECD

Deal considerations	▪ Control deals available ▪ Competitive auctions are standard ▪ Construction industry "contracts" but does not "own" underlying assets	▪ Fewer "control" deals – good to have local partner with "skin in the game" ▪ More "risk sharing" negotiated deals ▪ More middle market opportunities ▪ Construction companies "promote and own" assets –they have project management skills

The Actuarial Profession
making financial sense of the future

Globally deficient infrastructure: by the numbers

- **$4 trillion** – The cost of required power-sector infrastructure improvements in OECD countries over the next 30 years[1]
- **500 million gallons** – The amount of water leaking DAILY from old and rotted pipes during London's 2006 drought (equal to 10 million bathtubs)[2]
- **$16 trillion** – The cost to modernize and expand water, electricity and transportation systems in the U.S., Canada and Western Europe over the next 25 years[3]
- **$500-600 billion** – What the OECD countries are expected to spend annually on electricity, road, rail and water infrastructure over the next 25 years[4]
- **>70,000** – The number of structurally deficient bridges in the United States[5]

1, 2, 3 Booz Allen Hamilton, Strategy + Business, issue 46, Spring 2007. 4 OECD Study 2006. 5 U.S. DOT, Federal Highway Administration

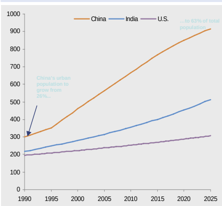
The Actuarial Profession
making financial sense of the future

Highly attractive sector dynamics: urbanization and the expanding middle class are key drivers for the strong demand for infrastructure

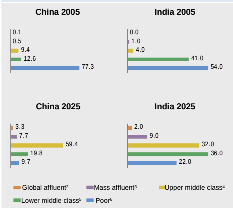
- **<u>18 million people a year</u> are expected to move into cities in China for the next <u>20 years</u>, *equivalent to adding a city the size of Shanghai every year***
- **India urbanization expected to be 10 million per annum over a similar period**

- **Chinese and Indian middle classes forecast to expand rapidly**
  - **China expected to add 30 mm/yr to its middle class for the next 20 years**
  - **India's middle class expected to grow by 25 mm people per year through 2025, from the current 5% of the population to over 40%**

Urban population (millions)



Evolution of the middle class in China & India[1]



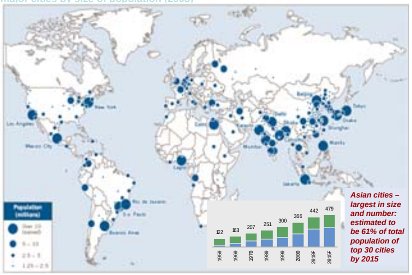
Sources: Global Insight, McKinsey Quarterly, Population Division of the Department of Economic and Social Affairs of the United Nations Secretariat

Notes: [1] Percentage of total, data for China is for urban households, India is for total households
For China: [2] >RMB200,000 (USD26,667). [3] >RMB100,001–RMB200,000 (USD13,333 - 26,667). [4] >RMB40,001–RMB100,000 (USD5,333 – 26,667). [5] >RMB25,000–RMB40,000 (USD3,333 – 5,333). [6] <RMB25,000 (USD3,333)
For India: [2] >Rs1,000,000 (USD25,000). [3] >Rs500,000–Rs1,000,000 (USD12,500-25,000). [4] >Rs200,000–Rs499,999 (USD5,000-12,500). [5] >Rs90,000–Rs199,999 (USD2,250-5,000). [6] <Rs90,000 (USD2,250).

The Actuarial Profession
making financial sense of the future

The changing global map: Asian cities have emerged as the world's largest urban centers - all need infrastructure

World's major cities by size of population (2003)

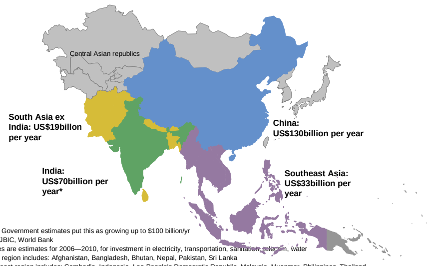


Sources: *Global Shift, Fifth Edition: Mapping the Changing Contours of the World Economy* (2007) (based on information from UN Centre for Human Settlements, 2003); *Cities of Asia - Heritage for the Future*, UNESCO (http://whc.unesco.org/events/asiaciti.htm)

The Actuarial Profession
making financial sense of the future

Where are the expected needs?

- Developing economies across the region require significant new capital over the near term



* Recent Indian Government estimates put this as growing up to $100 billion/yr

Sources: ADB, JBIC, World Bank

Figures are estimates for 2006—2010, for investment in electricity, transportation, sanitation, telecom, water

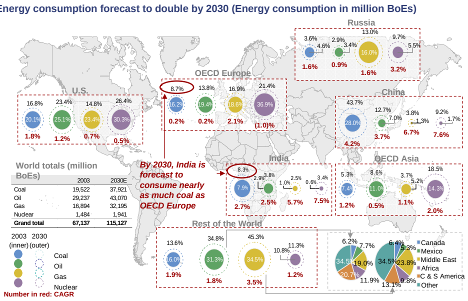
South region includes: Afghanistan, Bangladesh, Bhutan, Nepal, Pakistan, Sri Lanka

Southeast region includes: Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Thailand, Timor-Leste, Viet Nam

The Actuarial Profession
making financial sense of the future

In 2006 alone, China added more capacity than France has added over the past 60 years

Energy consumption forecast to double by 2030 (Energy consumption in million BoEs)



World totals (million BoEs)

	2003	2030E
Coal	19,522	37,921
Oil	29,237	43,070
Gas	16,894	32,195
Nuclear	1,484	1,941
Grand total	**67,137**	**115,127**

Sources: U.S. Energy Information Agency International Energy Outlook (2006)
OECD Europe includes Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, the Netherlands, Norway, Poland, Portugal, Slovakia, Spain, Sweden, Switzerland, Turkey, and the United Kingdom; OECD Asia includes Japan, South Korea, Australia, and New Zealand

The Actuarial Profession
making financial sense of the future

The case for Infrastructure Investing

The Actuarial Profession
making financial sense of the future

Disclaimer

For professional investors only - not for onward distribution. The information in this presentation is provided by JPMorgan Asset Management (UK) Limited and is based on its understanding of law and regulation at March 2008. The opinions expressed are those held by JPMorgan Asset Management at the time of going to print and are subject to change. This material should not be considered by the recipient as a recommendation relating to the acquisition or disposal of investments. This material does not contain sufficient information to support an investment decision and investors should ensure that they obtain all available relevant information before making any investment. Investing in alternative assets involves higher risks than traditional investments and investors should consult a professional advisor prior to investing. Alternative investments have higher fees than traditional investments, may not be tax efficient and may also be highly leveraged and engage in speculative investment techniques, which can magnify the potential for investment loss or gain. JPMorgan Asset Management (UK) Limited is authorised and regulated in the UK by the Financial Services Authority. This document is published by The Actuarial Profession, Staple Inn Hall, High Holborn, London, WC1V 7QJ.

The Actuarial Profession
making financial sense of the future