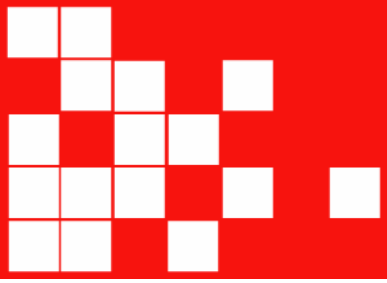
Macquarie Research
Equities

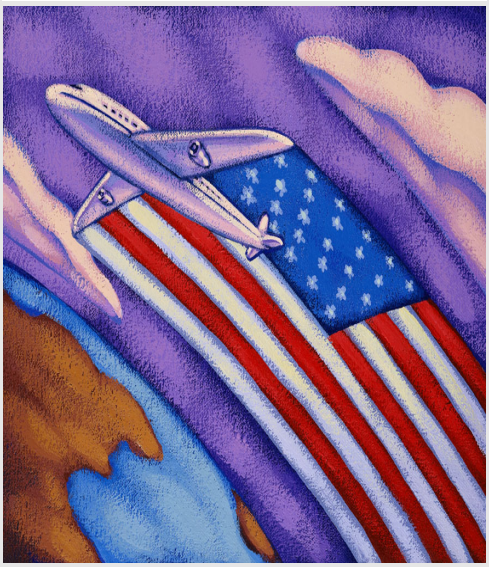


MACQUARIE

GLOBAL

Infrastructure

2 May 2007



Inside

Analyst
David Rickards
612 8232 4017 david.rickards@macquarie.com
Ian Myles, CFA
612 8232 4157 ian.myles@macquarie.com
Ofer Karliner, CFA
612 8232 4572 ofer.karliner@macquarie.com

Managing editor
Lotte Pang
852 2823 3591 lotte.pang@macquarie.com

A little less conversation, a little more action

Developing countries have typically been leaders in private infrastructure investment but traditional markets such as the US are starting to catch up. For potential investors, the most exciting aspect of the US market is its potential size of US$2,995bn[1]. The US has a well-established utilities market but an underdeveloped transport infrastructure market. To date, privatisation of US infrastructure has been characterised by a lot of conversation but little action. However, private investment is starting to emerge, particularly in the road sector. Twenty one US states have public-private partnership (PPP)-enabling legislation and numerous bids to build or upgrade existing roads are being considered.

Demand for infrastructure assets is booming

Demand for infrastructure assets is at an all-time high, with an average of around US$1bn a month of new equity being committed to the sector. There is about US$38bn and US$51bn of new money in private funds looking to be invested, as well as the potential for additional investment from listed companies with a market capitalisation of US$1,760bn. The utility, transport and other infrastructure sectors continue to develop separate identities, with the defining features being steady cashflow and predictable yields over the long term.

Supply is limited, leading to a re-rating of assets

The Macquarie Global Infrastructure Index (MGII), which serves as a proxy for globally listed infrastructure companies, was up 18.1% pa between December 2002 and December 2006, with the global transport infrastructure index up 34.8% over a similar period - both well ahead of global indices. The challenge for the sector is the supply of assets. Thus far, the number of new deals coming to market has not kept up with the growth in demand. This has resulted in a re-rating of infrastructure assets, which has increased prices. Recent airport transactions have been occurring at multiples of 20x-plus against a historical average of around 13x. Likewise in the road sector, greenfield toll roads are being won on IRRs of 4-5% over the prevailing 10-year bond rate against a historical average of 5-8%.

Cinderella now at the ball

There are currently over 350 infrastructure companies in the listed universe, representing 7% of the world's market capitalisation. As an indication, the total market cap of the MGII has grown from US$465bn in 2000 to US$1,758bn in March 2007. Faced with declining risk-adjusted returns from traditional investment channels, investors are increasingly going down non-traditional routes in search of better investment options. In mature markets like Australia, for instance, pension funds have increased their investments in infrastructure to around 5%. The key characteristics of infrastructure – high entry barriers, inelastic demand, stable cashflow and long duration – are a good match for the requirements and long-dated liabilities of pension and infrastructure funds. Infrastructure also exhibits a hybrid nature of both fixed income and capital gains and offers a variety of risk and return profiles.

[1] Bureau of Economic Analysis, 2006 – represents value of public sector held infrastructure

RESEARCHREPORT

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

FTSE THE INDEX COMPANY

Global Research March 2007

FTSE RESEARCH

Andy Harvell
Head of Research
andy.harvell@ftse.com
+44 (0)20 7866 8986

FTSE PRODUCT MANAGEMENT

Lillian Goldthwaite
Business Unit Head – Equities
lillian.goldthwaite@ftse.com
+44 (0)20 7866 8062

Gareth Parker
Business Unit Head - Alternatives
gareth.parker@ftse.com
+44 (0)20 7866 1805

Mike Bruno
Business Unit Head – Fixed Income
mike.bruno@ftse.com
+ 1 212 641 6120

FTSE MARKETING & COMMUNICATIONS

Andrew Buckley
Director, Marketing & Communications
andrew.buckley@ftse.com
+44 (0)20 7866 8029

"The World's most comprehensive infrastructure index"

Executive Summary

Based on the FTSE Global Equity Index Series (GEIS) and calculated by FTSE Group, the Macquarie Global Infrastructure Index Series is designed to reflect the stock performance of companies engaged principally in the management, ownership and/or operation of infrastructure and utility assets.

These infrastructure and utility assets are basic services, facilities and/or institutions upon which the growth and development of a community depends. These assets include toll roads, airports, rail track, shipping ports, telecommunications infrastructure, schools, hospitals and utilities such as electricity, gas distribution networks and water.

The worldwide growth in both infrastructure, particularly from the growing trend for PPPs and the privatisation of government owned assets and utilities is proving to be one of the fastest growing asset classes, with secure income streams guaranteed for extended fixed-terms contract periods. Owing to the similarity of infrastructure assets to fixed interest securities in their relatively fixed income streams and fixed contract terms, often backed by a government guarantee, performance of the Macquarie Global Infrastructure indices has been compared to the FTSE Global Bonds Index. It can be shown that there is a negative correlation due partly to a higher yield than bonds and the hybrid nature of some infrastructure companies.

The Macquarie Global Infrastructure Indexes

The series consists of the top-level Macquarie Global Infrastructure Index and the Macquarie Global Infrastructure 100 Index. In addition there are six regional indexes, four sector indexes and four further sub-sector indexes.

Using the Indexes

The Indexes are designed to be used as a performance measure of infrastructure stocks, the basis for ETFs and index linked products and a range of tailored infrastructure investment products.

(see full report starting from page 52)

US infrastructure – A little less conversation, a little more action

Gathering momentum – just starting to shake

In almost all major economies, private investment in infrastructure has been booming, with moves by most governments toward the privatisation of state-owned infrastructure assets or the use of private money to develop new projects.

The US has been slow to the party, but it appears to be starting to shift

The US has been slow to the party, but it appears to be starting to shift – spurred on by stretched state and municipal budgets, the need to address growing congestion or ageing assets, as well as the quantum investors are now paying for these assets. Private investment in toll roads, including the Chicago Skyway, the Indiana Toll Road and, more recently, SH121 in Texas, has propelled infrastructure privatisation into the US public and investors' consciousness. Investors see the potential for the US to become the world's largest market for private infrastructure investment, with an estimated potential size of US$2,995bn[2] – but so far we have seen a lot of conversation but not much action.

The US has a well-established utilities market, with most utility assets largely privatised, but it has an underdeveloped transport infrastructure market. In 2005, the American Society of Civil Engineers estimated that the US required a total investment of US$1.6tr over the following five years just to repair and build required highways, bridges, dams, airports, railroads and other infrastructure[3]. It also rated US infrastructure as poor.

A report by a US transportation research organisation in October 2006 supported this, estimating that approximately 26% of the nation's major metropolitan roads – interstates, freeways and other principal arterial routes – have pavements that are in substandard condition[4].

Fig 1 America's 2005 infrastructure report card

Sector	Grade
Aviation	D+
Bridges	C
Dams	D
Drinking Water	D-
Energy	D
Hazardous Waste	D
Navigable Waterways	D-
Public Parks and Recreation	C-
Rail	C-
Roads	D
Schools	D
Solid Waste	C+
Transit	D+
Wastewater	D-
America's Infrastructure G.P.A.	**D**

Source: American Society of Civil Engineers 2006, Macquarie Research, April 2007

[2] Bureau of Economic Analysis, 2006 – represents value of public sector held infrastructure

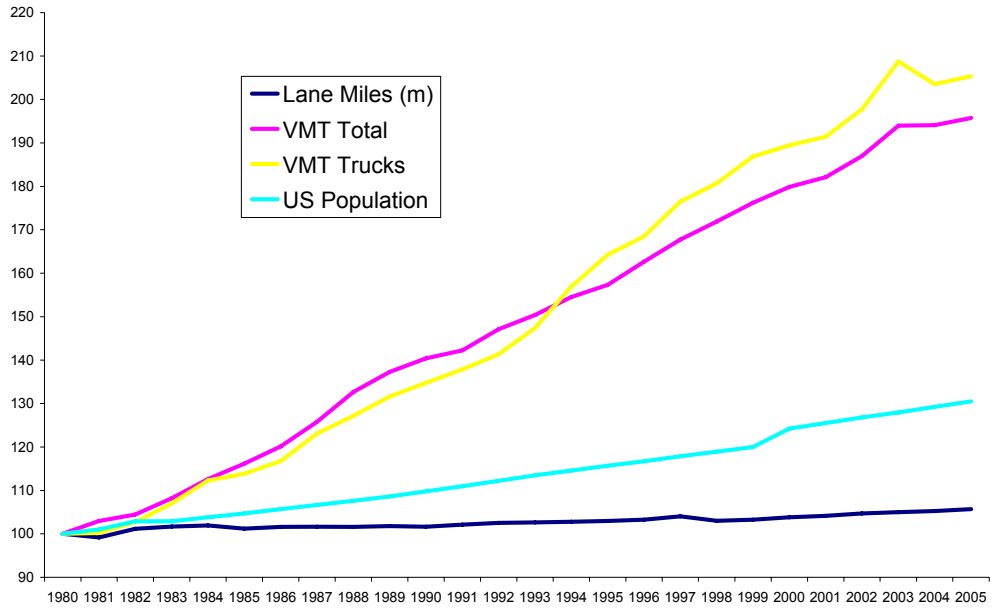
[3] http://www.asce.org/reportcard/2005/page.cfm?id=103

[4] http://www.tripnet.org/RoughRideReportOct2006.pdf

Over the last 50 years the excess supply in road capacity has been absorbed and is straining the existing system

According to the US Census Bureau, the current population of the US is around 301m. It is growing at 0.8% per annum, with the population forecast to reach 420m by 2050. Population growth is fuelling demand for road capacity (see Figure 2). However, as the same chart highlights, supply of additional capacity has been limited. Thus, over the last 50 years the excess supply in road capacity has been absorbed and is straining the existing road system.

Fig 2 US road demand



Source: U.S. Census Bureau 2004, Federal Higways Administration, Macquarie Research, April 2007

Highway-related expenditure alone was US$147bn in 2004[5], which suggests this is not even maintaining the existing systems. States facing growing populations and burdened with debt but unwilling to lift the general fuel tax to fund the necessary investment are finding private capital to be the logical solution.

FAA forecasts passenger growth of 52% between 2005 and 2015

In aviation, the Federal Aviation Administration has forecast passenger growth of 4.3% per annum between 2005 and 2015 – which represents a 52% increase in passenger traffic over 2005 levels. There is also a forecast 29.5% increase in aircraft movement. It is estimated that US$9[6]-15bn[7] is needed annually to enable airports to meet this demand.

Public transport is another area that requires significant investment over the coming years. In 2002, the Federal Transit Authority estimated that US$15.6bn is required annually to maintain the public transport system, while US$24.0bn[8] would be required annually to bring systems up to a “good” standard. In 2002, capital outlays for transit were US$12.3bn.

Social public-private partnerships (PPPs) are quite mixed in their level of progression. While private involvement in the prison system is quite progressed, the application of this method of financing to hospitals and schools is less so.

[5] US Department of Transport – Federal Highway Administration, Office of Transportation Studies

[4] Federal Aviation Administration

[5] Airport Council International

[6] Federal Transit Authority

The Federal Government – turning up the music

Transport infrastructure opening up to private investment

The Federal Government has indicated in a number of ways that it is serious about opening transport infrastructure up to private investment.

In August 2005 the Federal Government enacted legislation allowing Private Activity Bonds (PABs), which enable for-profit companies to get the same tax-free status for their borrowings that is available to state, local government and not-for-profit toll roads. There is a total of US$15bn available to be allocated to projects, and in October last year the US Transport Secretary gave provisional approval to the first application for such funding, the Texas Department of Transport's application for tax-free status for US$1,866m of bonds to be issued for construction and operation of the SH121 (interestingly it was not used by Cintra, the bid winner, despite the other bidders using this as part of their proposals).

The Federal Government also has a Transportation Infrastructure Finance and Innovation Act (TIFIA) assistance scheme which can take the form of direct loans, loan guarantees and standby lines of credit to approved projects. The direct loans are highly subordinated, debt service deferrable and low interest. Congress authorised US$122m for each Federal fiscal year from 2005 through 2009. These funds pay the subsidy cost to the Federal Government of providing credit assistance and are available until expended by the Department of Transport or reprogrammed by Congress. Based on experience, this funding amount can support more than US$2bn of average annual credit assistance.

The Federal Government has also passed enabling legislation and the US Department of Transport has published model PPP legislation which highlights the basic elements states need to consider and address in authorising legislation.

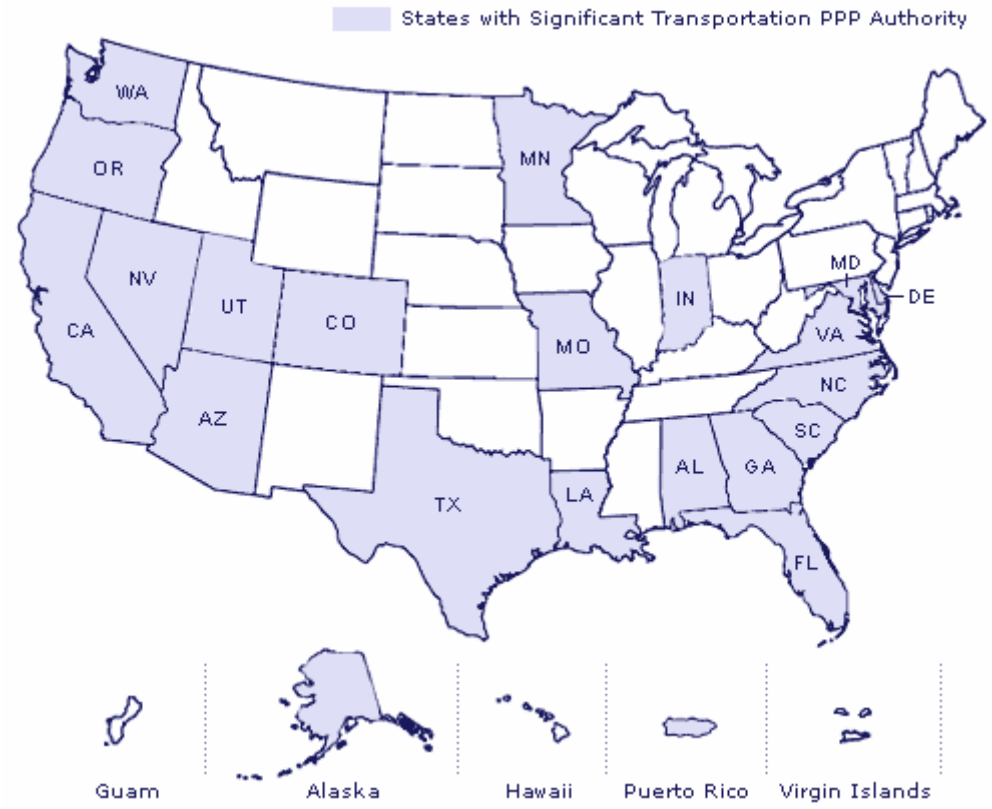
The states' legislative environment – still a lot of conversation

Many US states have significant PPP legislation for the development of transportation infrastructure

Twenty one US states and one US territory have enacted statutes that enable the use of various PPP approaches for the development of transportation infrastructure[9] with little or no national or even state-level coordination. Consequently, existing legislation ranges from authorisation for a single project (such as in Alaska), to comprehensive state-wide programmes.

The rapidly growing states, such as Virginia, Florida, Texas, Oregon, Washington and California, are the most progressed – although problems can arise even in these states.

Fig 3 States with significant transportation PPP legislation in place



Source: Federal Highway Authority, 2007

Texas is probably the state that has embraced the PPP model for infrastructure funding the most

Texas is probably the state that has most actively embraced the PPP model for infrastructure funding, with the SH130 and SH121 moving recently to the preferred bidder stage and significant progress towards privatisation on a number of other corridors. All this good work was put at risk recently when the chair of the Texas senate transport committee introduced, and got support for, a concession moratorium bill that would effectively block the signing of any toll concessions – including the SH121 and SH130 – until 1 September 2009.

Subsequently the state senator has said he won't allow a vote on the bill as he says he now sees the need to find a compromise. While this is positive for infrastructure in the state, and indicates that they recognise the need for such development, it also serves to highlight the political risk associated with any infrastructure investment, despite the gain for users.

Going the other way, the Florida house recently passed a toll road privatisation bill that would allow the Florida department of transport to "lease toll facilities to private entities" including existing roads (with the exception of the Florida Turnpike System). It however prohibited tolls on any interstate not tolled by 1 July 1997 with the exception of high occupancy toll (HOT) or express lanes on interstates.

[9] US Department of Transport – Federal Highways Administration

In Mississippi, PPP toll road legislation has made its way through the Mississippi Senate and House and a final draft of the legislation is currently being negotiated. In Tennessee, a bill entitled the "Tennessee Tollway Act" has been introduced in both houses of the state legislature.

In Pennsylvania, the Governor of the state has said he would introduce enabling legislation to allow “the means by which the [Pennsylvania] Turnpike transaction could be structured and approved”. Whether this is specific to the Turnpike or broader PPP legislation is not clear, however initial indications are that he would have bi-partisan support for the bill.

In New Jersey things are a bit murkier. The State Governor wants to privatise the NJ Turnpike, the Garden State Parkway and the Atlantic City Expressway. He is however facing a hostile state house transport committee which has said it would introduce a bill to prohibit any privatisation of road assets and ban the state from leasing and selling transportation facilities to "foreign" companies.

Private and public money – ready to boogie

Sector capacity for a global investment is in the order of US$50-65bn

Macquarie Research Equities has identified between US$38-51bn of equity currently held in various unlisted funds that is destined for infrastructure investments globally. Listed companies could lift this by another US$10-15bn; thus the sector capacity for a global investment is in the order of US$50-65bn. Even though not all this money is destined for US infrastructure or utility projects, it highlights that there is an emerging market for infrastructure from both the listed and unlisted sector.

Including debt, project value equates to around US$125-217bn

The equity is only half the equation. With the debt markets offering substantial liquidity, the structuring of the debt is better shaping revenue, thus increasingly initial leverage. As a result, project value when debt is included equates to around US$125-217bn.

Fig 4 US$38-51bn of new equity to invest in infrastructure

Listed companies	Mkt cap (US$bn)	New funds	US$bn
MIG	7.5	MEIF II	4-5
Cintra	5.1	MIP	2-3
Abertis	17.2	Goldman Sachs	6-7
Brisa	6.9	CSFB/GE Capital	1-2
		AECOM	1-2
Fraport	6.6	Morgan Stanley	1-3
Map	4.9	Reef	1-2
Hochtief	4.9	Carlyle	1-2
Size	**53.1**	Transurban	1-2
		Babcock & Brown	1-2
		Fondo Italiano (F2i)	1.5
		BNP Paribas	1-2
Builders	**Mkt Cap (US$bn)**	Citigroup and Blackstone	5
Ferrovial	13.3	HSBC	1
Sacyr	16.6	Alinda Infrastructure Fund	3
Vinci	29.7	3i	1-2
		ABN Amro	1-2
		Henderson / Laing	1-2
		ING	1-2
		Instrata Capital	1
		TCL Drive	$3b
Size	**59.6**	**Potential Size**	**38-51**

Source: Macquarie Research, April 2007

This is likely to be only the tip of the iceberg

While this appears to be an enormous amount of capital, it is likely only the tip of the iceberg, with numerous smaller less visible groups also likely to emerge as deals come to market. Nowhere is this more obvious than in the 48 expressions of interest that the State of Pennsylvania received in response to the potential privatisation of the Pennsylvania Turnpike.

Fig 5 Groups who responded to the Pennsylvania Turnpike EOI

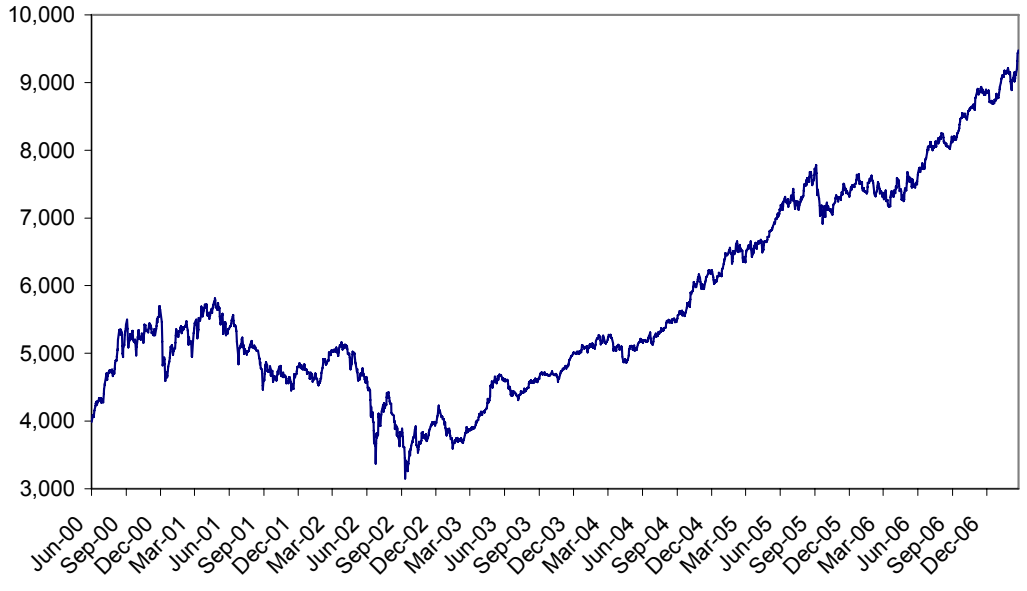
Owners/Financiers	Consultant/Advisory	Other
Abertis	Deloitte Consulting	Allen & Overy (Legal)
Banc of America Securities	HH Capital Advisors LLC (The Herrick Co. Inc.)	Ballard Spahr Andrews & Ingersoll (Legal)
Bear, Stearns & Co. Inc	Infrastructure Management Group	Cabrera Capital Markets
Borealis Infrastructure	KPMG Corporate Finance	Cash-Ware Inc
Cintra Developments	National Economic Research Associates Inc	Chapman and Cutler (Legal)
Credit Suisse Securities (USA)	Parsons Brinckerhoff	FFC Construction S.A
First Southwest Co	Rand Corp	HDR Engineering Inc (Engineering)
Fluor Enterprises Inc	Vantage Point Associates Inc., Norwalk, Conn. And The Public Private Strategy Group	Halcrow (Engineering)
Goldman, Sachs & Co		Mayer, Brown, Rowe & Maw (Legal)
Global Capital Finance		Michael Baker Corp (Engineering)
ING Group		Navigant Consulting
IRIDIUM Concesiones de Infraestructuras S.A		Nossaman, Guthner, Knox & Elliott (Legal)
J.P. Morgan Investments Management		PBS&J (Engineering)
J.P. Morgan Securities Inc		Santa Monica
Lazard Freres & Co.		Norwalk
Lehman Brothers		
Macquarie Securities (USA)		
Merrilll Lynch		
Morgan Stanley		
Pennsylvania Turnpike Commission		
Ramirez & Co		
RBC Capital Markets		
RREEF America		
The Carlyle Group		
Transurban (USA) Development Inc		
UBS Investment Bank		
Wachovia Capital Markets		

Source: Macquarie Research, April 2007

The demand for infrastructure assets has also manifested itself on the listed market. Between December 2002 and December 2006, the Macquarie North American Infrastructure Total Return Index increased at a compound rate of 22.1% and was already up 7.0% in the first quarter of 2007. The Macquarie Global Infrastructure Index (MGII) rose by a similar amount of 18.1%, with the global transport infrastructure index up 34.8% over a similar period.

Between December 2002 and December 2006, the Macquarie North American Infrastructure Total Return Index rose at a compound rate of 22.1% and was up 7.0% in the first quarter of 2007

Fig 6 Macquarie North America Infrastructure Index



Source: Macquarie Research, April 2007

Globally there have been more than 11 takeover bids in the last 18 months for listed transport infrastructure companies, increasing the scarcity of these companies, particularly in the developed markets of the US, Europe and Australia.

Putting on the blue suede shoes - upcoming projects

But only a handful of deals are expected to be closed in the next two years

For all the money chasing deals, the near-term pipeline is fairly short, with only a handful of deals expected to be closed in the next two years. One of the biggest impediments to progress is finding the political will to sell these assets. There have been a number of cases, most recently in Texas, where state legislatures have blocked or interfered with the privatisation of state assets. At this stage we are still hopeful that 2-3 projects pa can be completed, which is relatively low compared to the 48 projects that Cintra, a leading investor in toll roads headquartered in Spain, has been able to identify or the 39 identified by the Federal Highway Administration.

Fig 7 Potential upcoming road transactions

Road	State	Private	G or B	
Knik Arm Bridge	Alaska	Pot	b	State provided authority toll bridge operator to enter into PPP's or raise gov bonds
Colorado Springs	Colorado	yes	g	Un-soloicited proposal by Fluor build 33mile of toll lanes around eastern side of Colorado Springs. Right of ways are owned but needs approval from several different government departments. 33 miles, $575m
Northwest Parkway	Colorado	yes	b	Road opened in 2003. Due to financial trouble it is to be sold. Brisa/ CCR were selected as preferred bidder in April 2007
Prairie Falcon Parkway Express (nee Front Range Toll Road)	Colorado	yes	g	$2.5b, 210 mile toll road from Pueblo to Fort Collins, will include freigth and utilities corridor. New legislation in Colorado makes private toll road projects more difficult, but adds greater predictibility and transparency to the process
Road 301	Delaware	Yes	g	Proposed PPP, but was cancelled when deemed could be done cheaper if state owned.
Tampa Expressway	Florida	Yes		RFP released Mar-06
Georgia Hwy 316	Georgia	Pot	b	Drawn out process was restarted in Dec-05 after 6mth stall. Unsolicited proposal was to implement toll on existing road to finance upgrades
I-285 / I-20	Georgia	Yes	b	Goldman Sachs submitted unsolicited proposal for truck only toll lanes
I-75	Georgia	Yes	g	Bechtel (builder/contractor) awarded PPP (May-06) to add managed lanes to I-75. No other group submitted competing proposal
Hawaii	Hawaii	pot	g	Various roads needed to ease congestion but there are insufficient public funds to finance so private funds would be needed, but requires legislative change to enable
Highway 520 Bridge (Seattle)	Highway 520 Brid	pot	g	State review panel proposed PPP to replace the 520 bridge with 4-6 lane alternative ($1.7-3b est.)
Elgin-O'Hare Expressway - extension	Illinois	pot	g	Extension of the Elgin-O'Hare Expressway
Illinois Turnpike	Illinois	Pot	b	Credit Sussie appointed to conduct revenue study
Indinapolis bypass	Indiana	pot	g	120km ring road around south and east of Indianapolis
I-69	Indiana - Texas	Pot	g	part of a Federal corridor to create a new link north-south through the US. From Canada to Mexico.
New Jersey Turnpike	New Jersey	Pot	b	Road idenified as potential. Several bills have been introduced to Congress and the Senate to privatise the road UBS and Merril Lynch retained by state to review various assets for potential sale. Assets under review are New Jersey Turnpike, the Garden State Parkway and the Atlantic City Expressway over the last several months, but the assets covered by the current monetization financial advisory role also include transit facilities, rights of way, air rights or other developmental rights, naming rights, and infrastructure such as airports, bridges, water facilities, ports, parks and recreational facilities
Tappen Zee Bridge	New York	pot	b	PPPs be considered for the Tappan Zee Bridge restoration project
Cape Fear Skyway	North Carolina	Pot	g	In planning and environmental stage 2006-12
Garden Parkway	North Carolina	Pot	g	In planning and environmental stage.
Monroe Connector	North Carolina	Pot	g	In planning and environmental stage. Was supposed to be finialised in Dec-05
The Triangle Parkway	North Carolina	Pot	g	In planning and environmental stage 2006-12
Ohio Turnpike	Ohio	Pot	b	Proposed by new governor
Oregon road projects	Oregan	Yes	g	MIG undetertaking studies into 1 Greenfield and 2 widening projects
Pennsylvania Turnpike	Pennsylvania	Pot	b	Governor announced plans in Dec 06 to solicit the interest of private firms, including MIG, to lease or buy the highway
Southern Beltway	Pennsylvania	Pot	b	Pennsylvania Turnpike commission officials met with Macquarie officials earlier this year, and now the Australian firm is spending about $500,000 to study potential private-public investment in the Mon-Valley Expressway and the Southern Beltway in the Pittsburgh area. The 100 mile roads would be an extension of the Pennsylvania Turnpike
I95	South Carolina	Pot	b	State gov applied to Fed to allow tolling. May remain state owned
Harris County Toll Roads	Texas	Pot	b	83 miles of toll road under review for potential sale/lease. Process underway since Oct-05
IH 635 (LBJ)	Texas	Pot	b	Improvements to existing road. 4 short listed including Macquarie (Dec-05). Currently undergoing traffic and rev. study
San Antonio (US 281)	Texas	Pot	g	Cintra submitted unsolicited proposal for a new 3x3 toll road. 2 consortiums shortlisted Cintra and Macquarie in Jan-06
SH 161	Texas	Yes	g	11.5 mile ~$1bn, Unsolicited proposal submitted in Aug-05. 4 of 10 bidders (including MIG) have been asked to provide detailed proposals.
SR121	Texas	Yes	g	Cintra Sselected as proferred bidder in February 2007
Trans Texas Corridor (I-35)	Texas	Pot	g	Transport corridor crossing state north to south. First leg under construction by Cintra now. Open mid-07. Cintra has 50yr concession to toll once complete.
I-49	US - Canada	pot	g	The I-49 International Coalition recently suggested PPPs at its annual meeting to encourage Missouri, Arkansas and Louisiana to cooperate and complete the unfinished sections of I-49, a U.S. interstate which is already complete between Kansas City, Missouri and Winnipeg, Canada.
3 potenial projects	Utah	Pot	g	Mar-06 Utah passed PPP legislation. Several projects under review
I95	Virginia	Yes	b	Potential hot lanes. In negotiations with TCL
Route 460	Vrginia	yes	g	55 miles - bid solicited. Tolls will not cover cost so state will most likely fill gap. Cintra, Macquarie and Itinere/Sacyr bidding.$750m w/ tolls likely to pay 25-50% of 4 lane dual carriage way
Tacoma Narrows	Washington	No	b	Proposed that tolls be reapplied to road in 2007
West Virginia Turnpike	West Virginia	pot	b	Privatization of the West Virginia Turnpike was one of the possibilities discussed by a legislative subcommittee brainstorming potential ways to raise revenue for road work in West Virginia. The West Virginia Turnpike is an 88-mile, four lane highway providing a direct route south from Charleston, West Virginia. Designated I-77

Source: Federal Highway Administration, Macquarie Research , April 2007

Ultimately the infrastructure needs to be built and maintained and, with a growing gap between the infrastructure demands and the funding available to finance, construct, operate and maintain the infrastructure, something needs to give. The money has to come from somewhere and politicians, usually loath to increase taxes, are increasingly looking to the private sector.

It is probably only a matter of time before politicians are attracted to infrastructure as a source of funding

With the high prices that infrastructure assets are attracting, it is probably only a matter of time before politicians are attracted to the lure of infrastructure as a source of funding the infrastructure funding shortfall or as a means of raising capital to retire debt. There are also substantial economic benefits that flow from enhanced infrastructure that, in the medium term, cannot be ignored.

For both public and private investors, a steady pipeline of opportunities in the US market should start to emerge over the coming five years.

Fig 8 All shook up – Recent transactions

Transaction	Type	Sponsor/Seller	Buyer	Value	Date
Chicago Skyway	Brownfield	City of Chicago	MIG/Cintra	$1.8bn	2005
Dulles Greenway	Brownfield	Virginia DOT	MIG	$534m	2005
Indiana Toll Road	Brownfield	Indiana Finance Authority	MIG/Cintra	$4.0bn	2006
Pocahontas Parkway	Brownfield	Virginia DOT	Transurban	$611m	2006
Chicago Downtown Public Parking System	Brownfield	City of Chicago	Morgan Stanley	$563m	2006
SH130	Greenfield	Texas DOT	Cintra/Zachry	$1.3bn	2006
SH121	Greenfield/ Brownfield	Texas DOT	Cintra	$2.8bn	2007

Source: Macquarie Research, April 2007

Airport Privatisation Pilot Programme

The next big thing in the US could potentially be airports

While most of the transactions so far have been toll roads, the next big thing in the US could potentially be airports. In 1997, Congress established the Airport Privatisation Pilot Program to determine if private capital could accelerate airport development and provide benefits such as greater efficiency and enhanced customer service.

While the programme was limited to five participants, to date only Stewart International Airport, located in Newburgh, NY, has been granted an exemption. This resulted in the National Express Group being awarded a 99-year lease on the airport in 2000. However, in January this year the Port Authority of New York and New Jersey instigated a reverse privatisation by voting to buy back the lease from National Express.

Since 2000, several airports that had applied for the programme have subsequently suspended or withdrawn their applications. However, in September last year, the City of Chicago submitted a preliminary application for Chicago Midway International Airport.

This is significant for two reasons. First, the City of Chicago has shown itself to be a supporter of privatisation and has entered into two ground-breaking deals over the past few years – namely the Chicago Skyway and the Chicago Downtown Public Parking System. Secondly, and perhaps most importantly, of all the airports that have so far been considered for privatisation, none have been hub airports of the size or quality of Midway. Consequently, Midway will be observed closely and will be considered a true litmus test of the airport privatisation programme in the US. A successful outcome for Midway – both from the perspective of the City of Chicago and the airport customers – could see opportunities in the US airport sector finally open.

The banana skin on the dance floor – overcoming nationalistic fever

Anti-foreign sentiment is not limited to America

The anti-foreign company clause in the proposed New Jersey bill is short-sighted and political, but not in any way limited to America – one just has to look as far as the Italian Government's interference in the aborted Abertis/Autostrade merger last year, or Australia's limitation of foreign airport ownership for other examples.

Xenophobia also reared its head over Dubai Ports World's purchase of London-based P&O last year, which would have given it control of six US ports. Firms from other countries have also experienced significant resistance as a result of being foreigners. Macquarie Infrastructure Group (Australia) recently said that being a foreign firm was one of the major impediments it had to overcome when bidding with Cintra for the Indiana Toll Road.

This resistance was one among a number of reasons that Macquarie established a fund in the US. Likewise, Transurban is potentially following a similar path with DRIVE, its private US road fund. Cintra believes that, with appropriate partners, it can manage this concern.

Global infrastructure – a growth story

Drivers of growth

"We need an investment of about US$150bn in the next seven to eight years to realise our ambition to provide our country with an infrastructure which is equal to the economic and social challenges that we face" *Manmohan Singh, Indian PM*

One of the biggest challenges facing the world

An estimated 2% of annual GDP is spent on infrastructure investment & maintenance…

Infrastructure as a sector has grown rapidly. An estimated 2% of GDP, or around US$800bn, is spent on infrastructure investment and maintenance annually. As an indicator of the sector's growth, the total market capitalisation of the Macquarie Global Infrastructure Index (MGII), a proxy for listed global infrastructure, has grown from US$465bn since 2000 to US$1,758bn in March 2007.

…and the historic pace of growth is likely to continue

The historic pace of growth is likely to continue, fuelled by demographic and macroeconomic changes. A rising global population, strong economic growth and a greater focus on competitiveness are creating demand for new infrastructure close to 1% of global GDP. What is perhaps more important is that the maintenance of existing assets is estimated to be equal to a further 1.2% of global GDP[10].

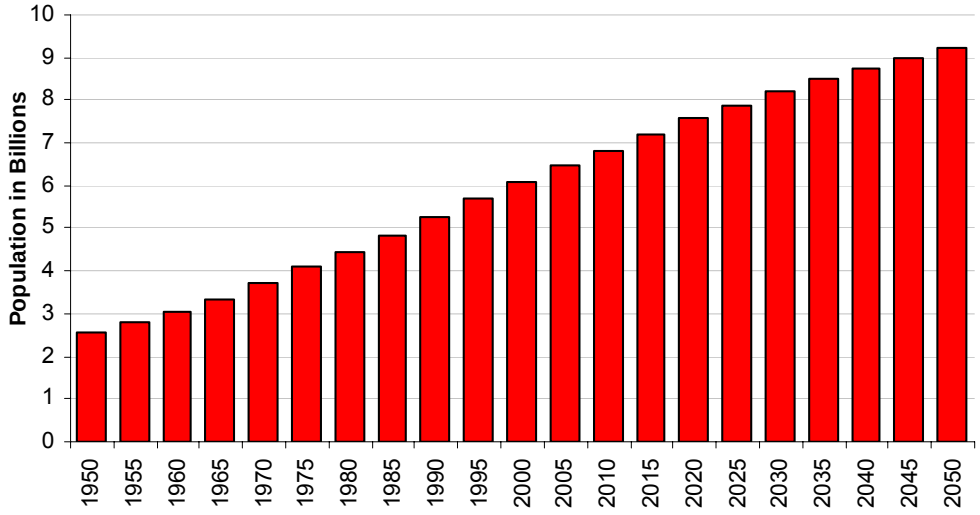
Demographic change

Rising populations and demographic change put pressure on existing infrastructure and create demand for increased investment.

The world population is expected to grow at an average rate of 1.1% annually to reach 7.2bn by 2015[11]. This is illustrated in Figure 9.

Rising population is putting pressure on existing infrastructure

Fig 9 Future global population growth



Source: US Census Bureau, August 2006

According to World Bank estimates, the urban population in East Asia and the Pacific region is projected to increase by 500m over the next 20 years. This will place tremendous pressure on existing urban infrastructure, especially basic services such as electricity generation, telecoms, water and sanitation. The World Bank estimates that infrastructure investment of close to US$180bn a year will be required for this region alone.

[10] World Bank

[11] US Census Bureau

Positive macroeconomic trends

Positive macroeconomic trends fuel demand

"***Growth in GDP is the main driver for investments in infrastructure."*** *Jack Hennessy, Baring Private Equity Asia*

Sustainable economic growth over the long term requires investment in new infrastructure and maintenance of existing infrastructure assets.

Strong economic growth, measured by increasing GDP and increasing wealth among consumers, is likely to spur infrastructure investment, particularly in developing countries. Higher incomes bring increased demand for a better quality of life, enhanced environmental and government services, and the extension of municipal services to the suburbs.

A condition of growth

Global infrastructure needs up to 2030 are estimated at US$30tr

The World Bank has recently focused on infrastructure development by emphasising the importance of infrastructure in contributing to growth.

Infrastructure opens opportunities for new businesses to develop, facilitates trade and expansion of existing businesses, and improves people's economic welfare. It contributes directly by improving access to vital resources such as water and electricity, and indirectly, by enabling the development of other key resources such as schools, hospitals and markets.

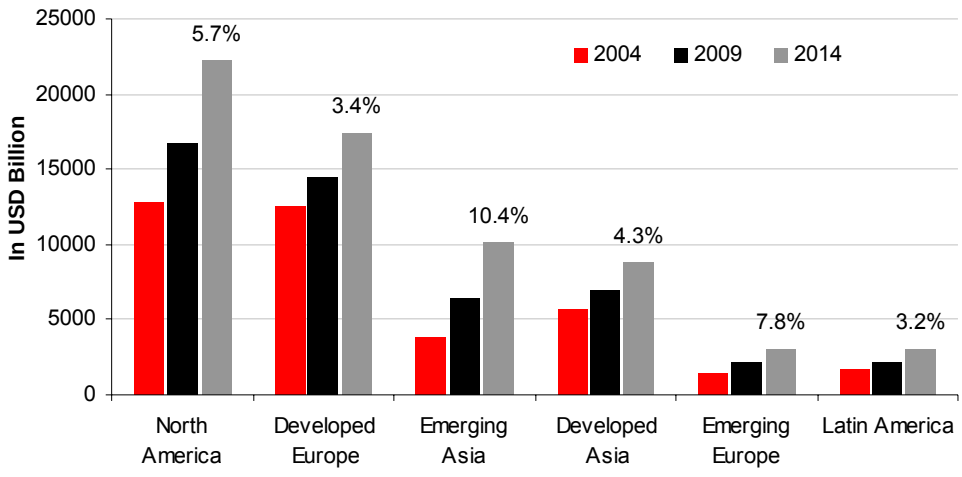
In Morocco, the construction of an all-weather road in rural communities increased attendance at one all-girls primary school from 28% to 68%. In another example, the completion of networked water and sanitation services in Ahmadabad in India increased the daily profits from vegetable farming by about US$1 per day, per person, and resulted a 75% fall in disease. Access to clean water can drastically reduce child mortality, while infrastructure such as a modern fuel source improves environmental conditions, leading to better health and livelihood.

Quantity and quality of infrastructure play an important role in attracting investment

The quantity and quality of infrastructure play an important role in attracting businesses and private investment and fostering trade. Studies by the World Bank suggest that had Africa witnessed infrastructure growth rates comparable to those in East Asia in the 1980s to 1990s, its annual growth rate could have been approximately 1.3% higher. Similarly, in Latin America, the lack of investment in infrastructure during the 1990s reduced long-term growth by 1–3%.

Figure 10 illustrates the GDP growth rates of various geographies over 2004–14.

Fig 10 Nominal GDP growth (2004-2014)



Source: Consensus Forecasts Global Outlook: 2004 – 2014, August 2006

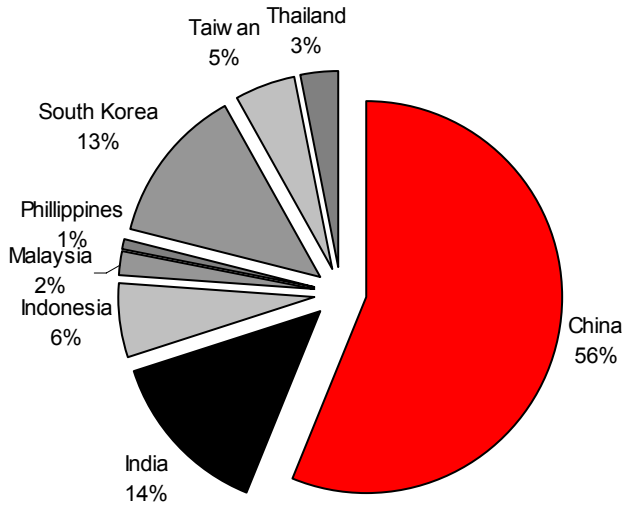
Emerging Asian and emerging European markets are expected to grow at compound annual growth rates (CAGR) of 10.4% and 7.8%, respectively, for 2004–14. GDP growth will drive demand for infrastructure investment, and sustainable growth can only be achieved through continued investment.

China – growth and investment

Figure 11 illustrates the growth in GDP attributed to various countries in emerging Asia. As shown, more than 80% of this growth will come from China, India and South Korea. China is expected to grow the fastest, making up 56% of the growth.

Infrastructure spending in developing countries must double to meet actual infrastructure financing needs

Fig 11 Percentage of GDP growth in emerging Asia by country



Source: Consensus Forecasts Global Outlook: 2004 – 2014, August 2006

A study by the World Bank and the ADB indicates that, to support this growth, China will need to invest US$132bn annually in infrastructure from 2006 to 2010 for new infrastructure assets and maintenance of existing ones (see Figure 12).

Its high rate of investment in infrastructure almost certainly contributed to China's GDP growth rate

China's attempt to boost its infrastructure is believed to be spurring a large part of its growth. According to a study by the ADB and the World Bank, China has invested large amounts in infrastructure during the last decade. During 1996-2005, China spent about US$1.07tr on infrastructure development, which amounted to 7.78% of its GDP on average. Although the share of infrastructure investment as a percentage of GDP has decreased from 9.51% in 1996–2001 to 6.74% in 2001–05, it has grown in absolute terms from US$486.35bn to US$580.71bn for these periods. Overall, in 1996–2005, the total rate of investment in China was almost four times that of other East Asian countries, which totalled US$56.2bn. This relatively high rate of investment in infrastructure was almost certainly a contributor to China's GDP growth rate, which increased at a CAGR of 11.4% during 1996-2005.

Growth to be sustained – China's infrastructure investment will grow to 6.9% of GDP by 2010

This growth is likely to be sustained, with China expected to account for 80% of infrastructure expenditure within East Asia in 2006-2010. It is expected that China will increase its investment by US$132bn for 2006-2010 (Figure 12), which amounts to 6.9% of its GDP. In contrast, the other East Asian countries will invest only US$33bn (Figure 13), ie, 4.5% of their GDP.

As illustrated in Figures 12 and 13, China is expected to increase its annual infrastructure spending by around 15% to sustain its GDP growth. Other countries in East Asia are expected to increase their infrastructure spending by around only 7%, which may dampen the GDP growth in these countries, highlighting the linkage between continued economic growth and infrastructure investment.

Fig 12 Investment and maintenance in China

	Investments			Maintenance		
China	**1996-2000**	**2001-2005**	**2006-2010**	**1996-2000**	**2001-2005**	**2006-2010**
Electricity	34,035	44,132	51,668	11,159	15,573	20,739
Telecom	13,377	10,174	11,735	5,770	6,322	8,232
Roads	13,764	22,105	19,345	3,555	5,765	7,424
Rails	803	980	963	1,063	1,161	1,258
Water	3,333	2,013	2,097	3,474	3,776	4,090
Sanitation	4,831	1,771	1,830	2,104	2,370	2,644
Total	**70,143**	**81,175**	**87,637**	**27,126**	**34,966**	**44,387**

Source: ADB-JBIC-World Bank East Asia Pacific Infrastructure Flagship Study, August 2006

Fig 13 Investment and maintenance in the rest of East Asia (without China)

	Investments			Maintenance		
All without China	**1996-2000**	**2001-2005**	**2006-2010**	**1996-2000**	**2001-2005**	**2006-2010**
Electricity	7,798	9,765	11,778	2,896	3,850	5,005
Telecom	2,081	3,299	2,065	1,070	1,835	2,139
Roads	2,269	4,427	3,830	2,754	3,150	3,503
Rails	402	290	207	305	323	314
Water	1,483	454	474	1,012	1,073	1,138
Sanitation	2,193	1,086	1,057	1,172	1,331	1,486
Total	**16,227**	**19,321**	**19,411**	**9,208**	**11,562**	**13,612**

Source: ADB-JBIC-World Bank East Asia Pacific Infrastructure Flagship Study, August 2006

Increased competitiveness a spur for spending

As competitiveness increases, so does spending on infrastructure

Quality of infrastructure is an important factor impacting a country's competitiveness. New foreign investment has to be supported with the appropriate quality of infrastructure to ensure investments in businesses and trade profit. As governments seek to increase their competitiveness, spending on infrastructure is also growing.

Figure 14 supports the idea that the competitiveness of a country is closely tied to the quality of its infrastructure. It plots quality of infrastructure (as measured by industrialists' perception of overall infrastructure quality, encompassing transport, energy, information and communications technology, and housing infrastructure) against the competitiveness ranking assigned by the World Economic Forum.

Fig 14 Infrastructure quality and growth competitiveness

Source: WEF Global Competitiveness Report 2004-05, August 2006

Higher investment in infrastructure is required for an economy to remain competitive & attract FDI

As illustrated in Figure 14, there is a linear relationship between quality of infrastructure in a country and its competitiveness. Finland, which scores highly on the growth competitiveness index,[12] gets a high score on infrastructure quality. Poland, on the other hand, with a low quality of infrastructure, ranks among the lowest in terms of growth competitiveness. This implies that higher investment in infrastructure is required for an economy to remain competitive and attract often much-needed foreign direct investments.

[12] WEF Global Competitiveness Report, 2004-05

Quantifying investment needs

"An estimated US$180bn is needed annually to be invested in water infrastructure in developing countries such as China and India. This is almost double the amount that's being spent at present." *World Water Council, Marseilles*

The demand for infrastructure investment is growing partly due to the demographic and macroeconomic trends highlighted above, but also because of the burden of maintaining existing and ageing infrastructure. Governments from developed and developing countries alike face similar challenges in providing and maintaining the infrastructure required for sustainable growth.

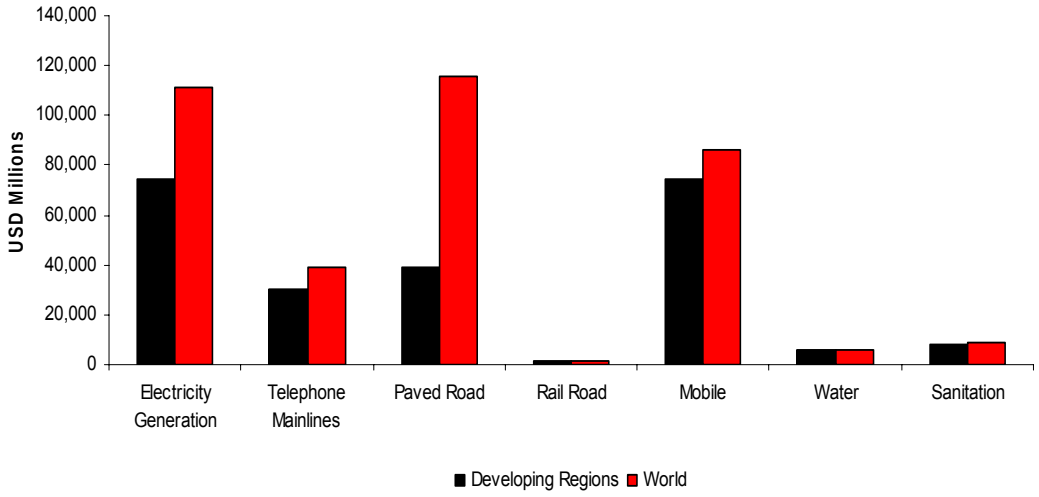
Global

Global infrastructure needs for transport, energy, water & communications to 2030 are estimated at US$30tr

Globally, infrastructure investment needs until 2030 are estimated at US$30tr for transport, energy, water, and communications infrastructure[13].

Figure 15 indicates the investment needs of new projects in developing regions as compared to those of the whole world.

Fig 15 Expected annual investment needs 2005–10 (US$m)



Source: World Bank, August 2006

Figure 16 illustrates that global investment needs for key infrastructure are estimated at around US$370bn annually for 2005–10. This amounts to nearly 1% of worldwide GDP.

Fig 16 Expected annual investment needs 2005–10 (US$m)[14]

		Electricity Generation	Telephone Mainlines	Paved Road Length	Rail Road Length	Mobile	Water	Sanitation	Total
REGION	East Asia & Pacific	25,005	17,041	12,133	164	41,155	1,799	2,608	**99,906**
	South Asia	11,124	3,233	6,575	126	3,392	1,912	1,707	**28,069**
	Europe & Central Asia	12,643	5,157	9,800	743	9,740	235	750	**39,069**
	Middle East & North Africa	7,307	1,278	3,308	51	1,850	399	691	**14,884**
	Sub-Saharan Africa	3,273	539	4,094	140	3,275	689	1,256	**13,268**
	Latin America & Caribbean	15,034	3,276	2,791	0	15,049	645	1,147	**37,944**
INCOME	High Income	37,051	8,706	77,056	1	11,595	565	982	**135,956**
	Low Income	17,990	4,835	13,598	491	6,393	2,974	3,706	**49,988**
	Middle Income	56,396	25,690	25,104	733	68,068	2,707	4,454	**183,151**
	WORLD	**111,436**	**39,231**	**115,758**	**1,225**	**86,056**	**6,246**	**9,143**	**369,095**

Source: World Bank, August 2006

[13] Foresight: Trends and Drives in Intelligent Infrastructure Systems

[14] Developing economies are made up of middle and low income countries

Electricity, mobile phones and roads will absorb 80% of planned investments

In terms of sector allocation, the World Bank estimates suggest that electricity, mobile phones and roads will absorb 80% of planned investments in developing countries worldwide. Electricity generation is likely to absorb about 30% of new and total investments. Figure 17 captures the future allocation of investment by sector.

Annual infrastructure maintenance investment is estimated at US$480bn globally, from 2005-2010

Fig 17 Sectoral allocation of investments, new and total (2005–10)

	Developing countries		World	
	New	Total	New	Total
Electricity Generation	32%	30%	30%	30%
Roads	17%	19%	31%	31%
Mobile	32%	27%	23%	20%
Telephone Mainlines	13%	14%	11%	11%
Water and Sanitation	6%	8%	4%	6%
Rail	1%	2%	0%	2%
Total (%)	100%	100%	100%	100%
Total (US$m)	233,139	464,793	369,095	848,719

Source: World Bank, August 2006

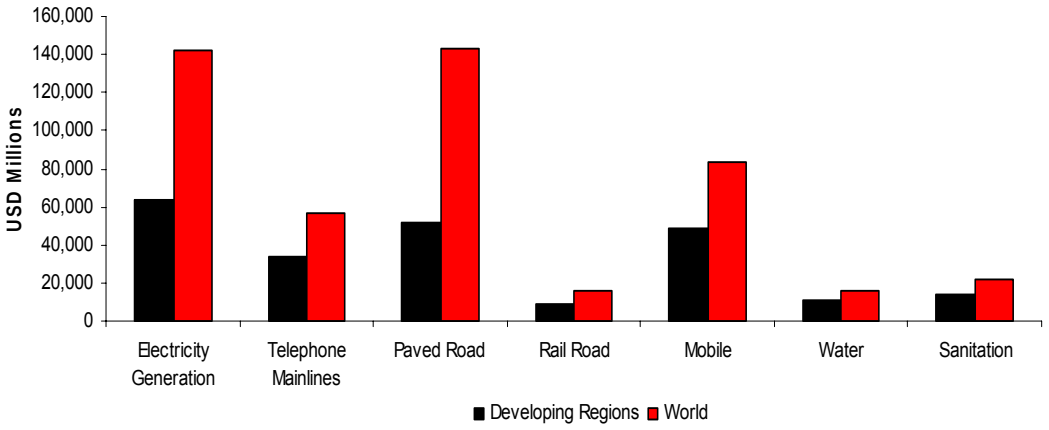
According to the International Energy Agency (IEA), in 2001–30, an estimated US$16tr will be required globally for new energy production, transmission and distribution infrastructure. More than 50% of this would be for the developing economies.

Maintenance costs – global

According to the World Bank, from 2005-2010 the annual maintenance investment need is estimated to be US$ 479.6bn or 1.2% of GDP.

Figure 18 illustrates the maintenance needs of developing countries, as compared to those of the whole world.

Fig 18 Expected annual asset maintenance needs 2005–10 (US$m)



Source: World Bank, August 2006

As shown in Figure 19, the main focus will be on the maintenance of paved roads and electricity generation, with more than US$280bn required for the maintenance of this infrastructure.

Fig 19 Expected annual asset maintenance needs 2005–10 (US$m)

		Electricity Generation	Telephone Mainlines	Paved Road Length	Rail Road Length	Mobile	Water	Sanitation	Total
REGION	East Asia & Pacific	18,373	16,838	8,475	1,426	26,070	3,602	4,202	**78,986**
	South Asia	6,986	3,404	15,753	1,372	1,815	3,286	2,417	**35,033**
	Europe & Central Asia	20,333	6,677	16,454	4,035	7,289	1,436	2,616	**58,849**
	Middle East & North Africa	4,625	1,569	3,616	450	1,344	629	1,030	**13,264**
	Sub-Saharan Africa	2,941	653	3,429	873	2,181	949	1,619	**12,644**
	Latin America & Caribbean	10,593	4,175	4,128	733	10,015	1,245	1,989	**32,878**
INCOME	High Income	78,403	23,181	91,742	6,858	34,934	4,719	8,133	**247,970**
	Low Income	13,293	5,321	22,858	2,918	3,730	5,036	5,462	**58,619**
	Middle Income	50,558	27,995	28,998	5,970	44,994	6,111	8,410	**173,035**
	WORLD	**142,254**	**56,496**	**143,598**	**15,746**	**83,658**	**15,866**	**22,005**	**479,624**

Source: World Bank, August 2006

Developing countries

Higher burden for developing countries

The burden of infrastructure provision is higher for developing countries because of a greater need for new investments, a much smaller resource base and greater difficulty in sourcing capital.

According to a study by the World Bank[15], 2.4bn people globally do not have access to sanitation, 2.5bn are without access to modern energy supplies, 1.2bn lack access to safe drinking water and 1bn are not able to use roads to reach markets, jobs and health facilities.

In East Asia, infrastructure needs are estimated at US$165bn annually over the next five years, or 6.2% of GDP

The Asian Development Bank (ADB)[16] estimates that in East Asia alone, the expected infrastructure service needs will be US$165bn annually over the next five years. This is approximately 6.2% of the region's annual GDP. This investment will be essentially focused on electricity, telecommunications, water and sanitation, and major transport networks. These estimates take into account both new investments and maintenance of existing assets. To meet these needs, it is estimated that 65% of the expenditure would have to be new investment.

According to the World Bank, in developing counties, the overall level of investment in water-related infrastructure is estimated to be almost US$65bn annually, of which US$15bn is on hydro, US$25bn on water and sanitation and US$25bn on irrigation and drainage. About 90% of this investment comes from domestic sources, primarily from the public sector.

Maintenance

According to a study by the ADB, 35% of the expected infrastructure service needs in East Asia will be for maintenance of electricity, telecommunications, water and sanitation, and major transport networks. Figure 19 provides estimates released by the World Bank outlining the future infrastructure maintenance needs of some developing countries.

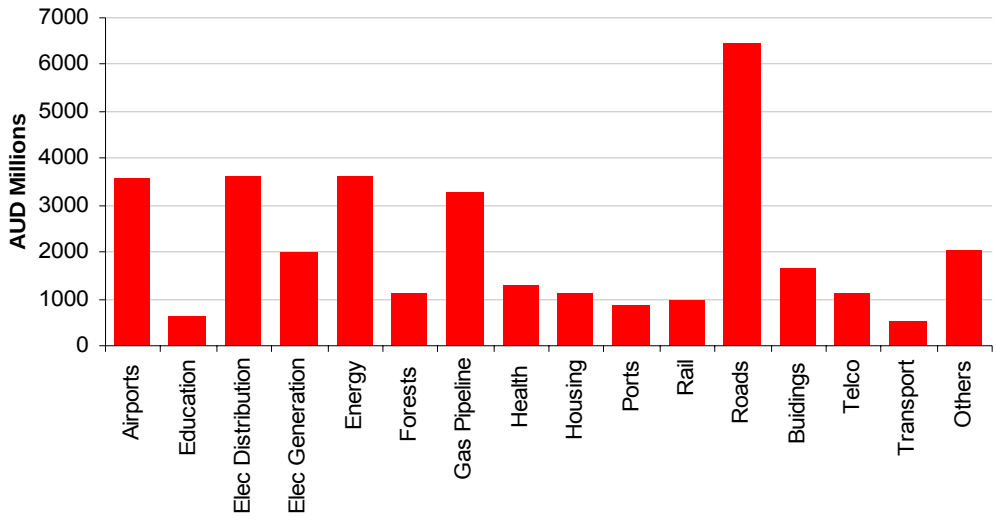
[15] Making Infrastructure Work for the Poor, 2002

[16] http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/EASTASIAPACIFICEXT/EXTEAPINFRASTRUCT/0,,contentMDK:20700727~pagePK:64168445~piPK:64168309~theSitePK:855136,00.html Asian Development Bank

Developed countries

Significant investment in infrastructure projects in developed economies, for example Australia and the US, is still being undertaken. Figure 20 represents the number of projects forecast in various infrastructure sectors in Australia.

Fig 20 Forecasted infrastructure projects in Australia



Source: AUSCID and AMPCI, August 2006

Maintenance

Government spending on infrastructure in OECD countries dropped to 2.2% of GDP in 1997-2003

Developed countries also face growing demand for their existing infrastructure. In the US, the Federal Aviation Administrator (FAA) projects annual passenger growth of 4.3% until 2015, representing a 52% increase over 2005. The number of aircraft handled by air traffic control is expected to increase from 45.1m in 2004 to 58.4m in 2015. US$ 9-15bn is needed annually to enable airports to meet this demand.

The US national power grid requires US$10bn annually over the next five years to ensure the reliability of its service. Lack of adequate and appropriate infrastructure was said to be one of the causes of the large scale power failure seen in the US in August 2003.

At present, 31.2% of urban bridges in the US are structurally deficient or functionally obsolete. The Federal Highway Administration (FHWA), US Department of Transportation, estimates that it will take US$9.4bn annually over the next 20 years to eliminate all bridge deficiencies.

In the US, 52.7m children were enrolled in elementary and secondary education in 1998 and this number is estimated to rise to 54.3m by 2008[17]. It is also estimated that 50% of schools serving over 20m children have unsatisfactory environmental conditions such as poor ventilation, heating and lighting[18]. These are in need of urgent repair. A paper published by the Economic Policy Institute suggests that in 2007, the deficit in education and training will be US$52bn[19].

In the UK, a consortium of private companies came together to build and maintain public works such as roads and hospitals in response to a deficit in funds being allocated by the government to building and maintaining this sort of social infrastructure.

These infrastructural challenges will have to be met if economic growth and competitiveness are to be sustained in some of the world's largest and most competitive economies.

[17] http://www.ed.gov/pubs/bbecho98

[18] U.S. General Accounting Office. School Facilities: The Condition of America's Schools. 2000

[19] http://www.epi.org/briefingpapers/pubinv.pdf

The infrastructure investment gap

"The infrastructure gap [in India] was holding back economic growth by 1.5-2% every year" *P. Chidambaram, Indian Finance Minister*

While demand continues to rise, govt spending has declined

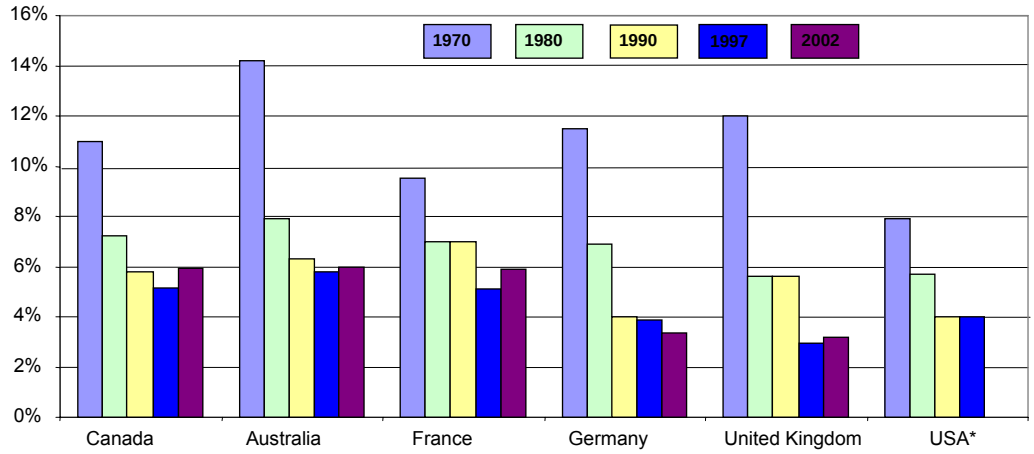
Governments, often faced with growing deficits and other demands on spending, are struggling to keep up with the growing demand for infrastructure investment. While demand continues to rise, government spending on infrastructure has declined, creating a widening investment gap.

From 1970 and throughout the 1980s and 1990s, public spending on infrastructure was broadly on a downward trend, partly as a result of high expectations from private sector involvement in infrastructure and partly from a shift in focus to social issues and poverty reduction. Figure 21 shows the decreasing government expenditure on infrastructure in some select Organization for Economic Cooperation and Development (OECD) countries in recent decades.

Govt spending in OECD countries dropped to 2.2% of GDP in 1997–2003 from 2.6% in 1991-97

Government spending on infrastructure in OECD countries dropped to 2.2% of GDP in 1997-2003 from 2.6% in 1991–97. Government capital formation, as a percentage of GDP, fell from 7.5% in 1984 to 3.9% in 2002.

Fig 21 Percentage of government spending on infrastructure (OECD)

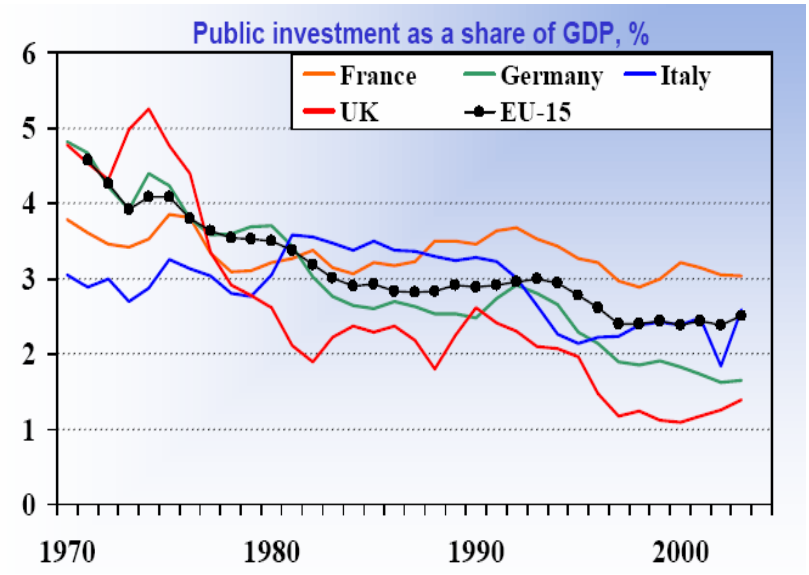


Note*: 2002 data not available for the US
Source: National Accounts, OECD, August 2006

PFIs have been on a downward trend globally

In the European Union (EU) alone, public investment showed a substantial downtrend from 1970, as illustrated in Figure 22.

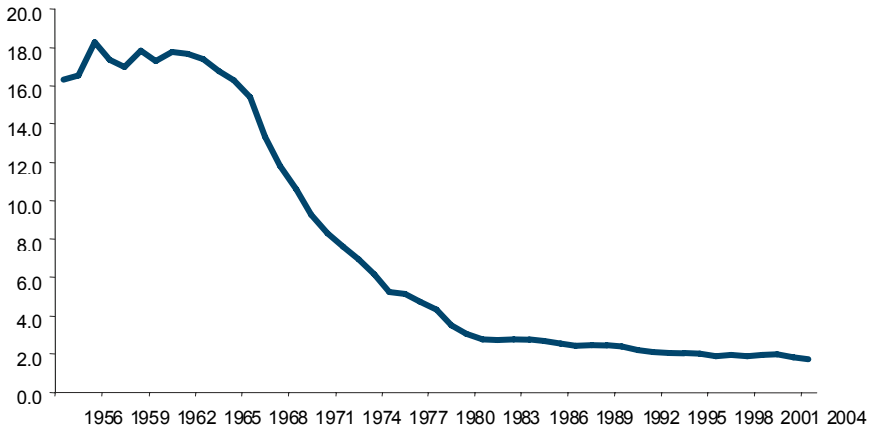
Fig 22 Large EU countries



Source: OECD (EIB Conference in Economics and Finance, Luxembourg, January, 2005)

Figure 23 shows a similar trend in the US, with a dramatic decline in public sector expenditure from 1962 onwards.

Fig 23 Gross public sector infrastructure capex* in the US (% of GDP)



*Note: capex data includes depreciation spending

Source: Macquarie Research, August 2006

Overall, the increased need for infrastructure investment and the decline in government spending has created an infrastructure investment gap.

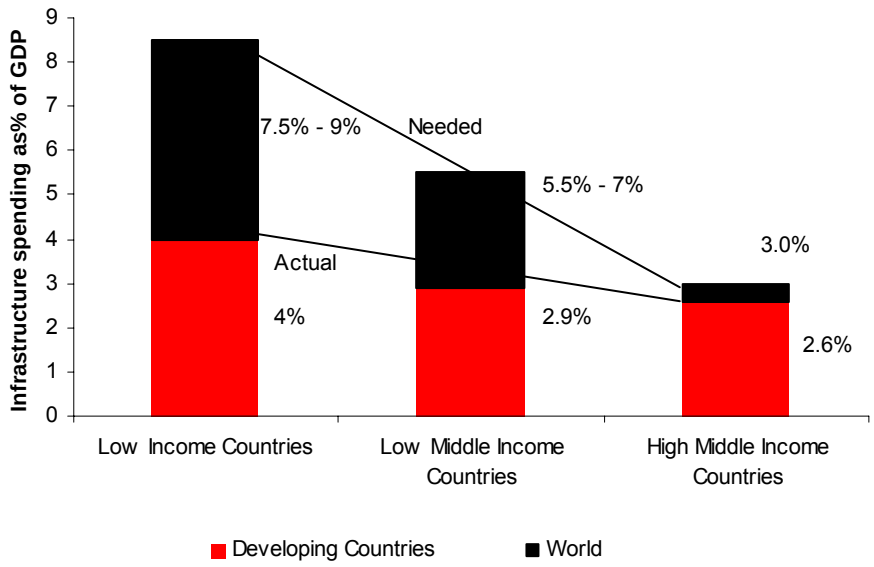
In the UK, continuous monitoring of the fiscal situation has encouraged the government to raise capital for investment in infrastructure. There has been a steady increase in public sector net investment from less than 0.75% of GDP in 1997–98 to 2.25% in 2005–06[20]. This has been utilised to provide better infrastructure across public services.

[20] http://www.hm-treasury.gov.uk/spending_review/spend_plancontrol.cfm

Wide gap between required investment in infrastructure and the actual amount invested

In 2003, the OECD published the following data on actual expenditure, as compared to the needed expenditure for infrastructure as a percentage of GDP. Figure 24 indicates the wide gap between the required investment in infrastructure and the actual amount invested.

Fig 24 Actual vs. needed expenditure for infrastructure



Source: World Bank, August 2006

The investment deficit in Canada is expected to widen further by 2027 to CAD115bn

The investment gap is particularly wide for low income countries, where the annual public spending accounted for only about 50% of the expenditure needed. However, the investment gap is still apparent in mature markets for infrastructure such as Canada.

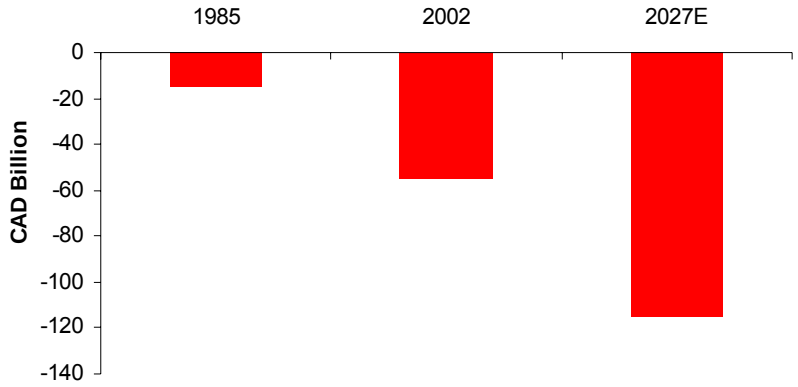
According to World Bank estimates, developing countries must spend an estimated 7% of GDP annually, in order to service infrastructure requirements for both new investment and operations and maintenance of existing infrastructure. Since developing countries today spend an average of 3-4% of GDP on infrastructure annually, they face a substantial investment gap.

Many developed countries face the same issue. There has been a consistent increase in Canada's infrastructure investment deficit, as illustrated in Figure 25. This is expected to broaden further by 2027[21]. The investment deficit of approximately CAD15bn in 1985 is expected to grow at a CAGR of 5% to CAD115bn by 2027.

[21] Canada West Foundation (Federation of Canadian Municipalities for years 1984, 1988, and 1992; FCM and McGill University Department of Engineering for 1996; and the Canadian Society for Civil Engineering for 2002)

The growing deficit in Canada is spread across various sectors. According to the Canadian Council for Public-Private Partnerships, the infrastructure investment needed for transportation in cities across Canada will amount to almost CAD23bn over the next few years. For urban roads and bridges, it is much higher at CAD66bn for the next 10 years. The main west Canadian cities of Vancouver, Edmonton, Calgary, Saskatoon, Regina, Edmonton and Winnipeg reported an infrastructure deficit of CAD564m in 2003. The Council added that if the current level of infrastructure under-investment persists, the deficit would grow to CAD1tr in 60 years.

Fig 25 Increasing infrastructure deficit in Canada



Source: The Canadian Council for Public Private Partnerships, August 2006

Transit infrastructure, roads, schools, water and wastewater in Ontario, Canada, need substantial investment over the next few years

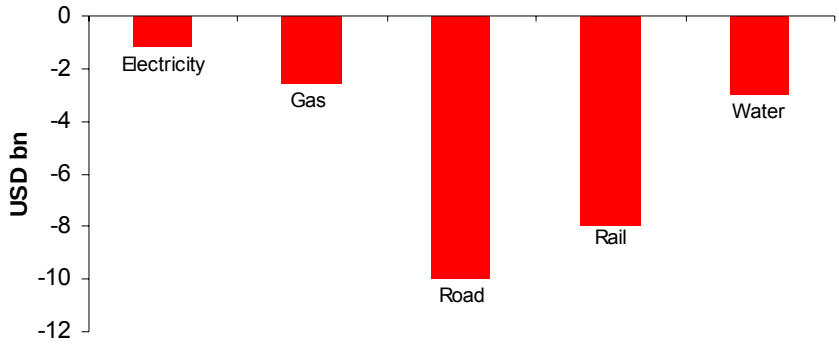
The following outlines the widening gap in some key sectors in Canada.

- **Transit infrastructure** – Almost CAD21bn was required for transit system infrastructure in 2004–08. However, there was a shortfall of CAD9bn as a result of the absence of new and external sources of funding. It is estimated that there will be a shortfall of CAD661m for transit system replacement and rehabilitation needs alone.
- **Ontario roads** – A study of 35 key Ontario municipalities found that more than CAD700m was needed for road reconstruction, while actual spending was only CAD255m. Drivers in Southern Ontario spend an average of almost CAD2,000 over the life of their vehicles repairing damage to their cars caused by poor road conditions.
- **Ontario schools** – The Equality Task Force Report (2002) estimated that there was about CAD5.6bn in deferred maintenance costs in schools across Ontario. The Ontario Public School Boards' Association estimates that the recent level of deferred maintenance costs stands at about CAD8bn.
- **Ontario water and wastewater** – The investment required to restore Ontario's current water and wastewater systems to a state of good repair and to maintain them in that condition is anywhere between CAD30–40bn over the next 15 years.

In Australia, spending on infrastructure by the government has declined from 14% of GDP in 1970 to 3.6% in 2004

In Australia, another active infrastructure market, the amount of spending on infrastructure by the government as a proportion of total domestic production has declined from 14% in 1970 to 3.6% in 2004. Making a sector-wise comparison, the gap is much wider for roads and rail as compared to water, gas and other sectors. In total, under-investment in Australia was at USD24.8bn in 2004. Figure 26 illustrates this under-investment.

Fig 26 Estimates of under-investment in Australian infrastructure by sector



Source: Modeling the Economic effects of overcoming under-investment in Australia Infrastructure, AusCID/ Econtech, 2 August 2004

Opening the doors to privatisation

"PPP in infrastructure development needs to be actively promoted. Both the Centre and the States have taken a number of initiatives in the last two years of the 10th Plan to promote infrastructure development." *P. Chidambaram, Indian Finance Minister*

Private capital now flowing into sectors traditionally the purview of govt

The widening investment gap has opened the door to private involvement in infrastructure provision. Governments are increasingly allowing private capital to flow into sectors which were traditionally under the complete purview of the government.

Historically, governments in developing regions have themselves funded about 70% of infrastructure investment needs, with 22% funded by the private sector and 8% by official development assistance. The need for infrastructure is so high in most developing economies that government funding alone is incapable of fulfilling the total demand.

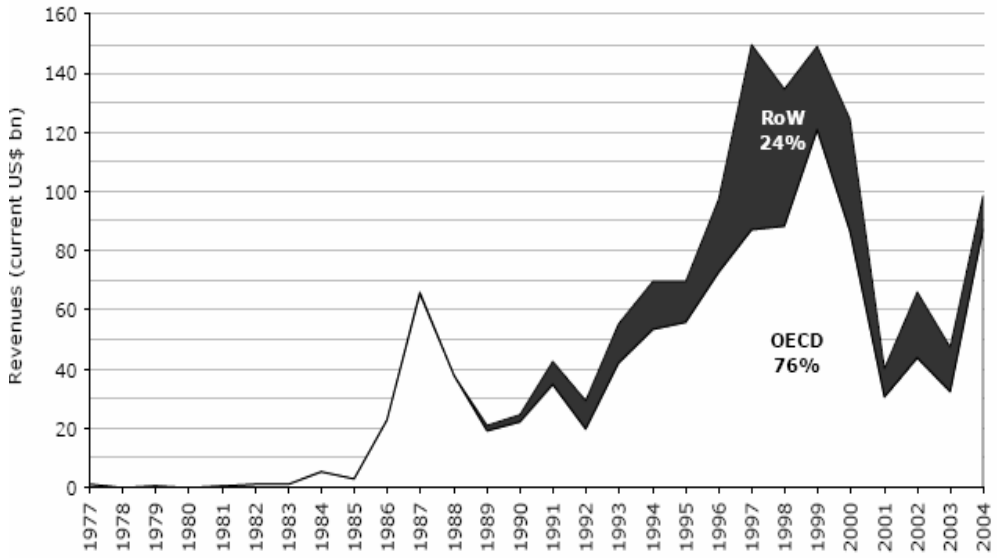
The private sector plays a much more important role than development assistance in bridging the gap in infrastructure investment. Of the total investment in infrastructure for developing economies, the private sector accounted for an estimated 25% while official development assistance accounted for less than 5%[22].

Private investors contributed US$580bn from 1990 to 1999

According to the World Bank, private investors contributed US$580bn in more than 1,900 infrastructure projects in developing countries from 1990 to 1999 [23] This figure was estimated to be 3.5 times the total amount it lent to developing countries over the same period.

Figure 27 gives an interesting overview of the privatisation scenario from 1990 onwards in the OECD countries as compared to the 'Rest of the World' (RoW).

Fig 27 Estimates of under-investment in Australian infrastructure by sector



Source: Elaborations on Securities Data Corporation, August 2006

Figure 27 indicates that the years from 1977-1985 experienced little or no revenues from privatisation, all of which was concentrated in the OECD countries. The RoW started deriving some benefit from privatisation from 1989 onwards, albeit minor.

In the early to mid-1990s, privatisation in OECD countries ranged between US$20–55bn annually. It started on an upward trend in 1995 and peaked in 1999 at almost US$120bn. Revenues started declining thereafter. This could be attributed to the Asian financial crisis of 1997 and the Russian debt crisis of 1998. Similar trends were also observed in the RoW. However, from 2001, there was a modest pick-up. The important point to note is that privatisation has been rising since 2003.

[22] http://www.oecd.org/dataoecd/23/13/36567616.pdf OECD

[23] http://www.highbeam.com/library/docFree.asp?DOCID=1G1:75607816

Increased opportunities for private investors

The trend towards privatisation of infrastructure has increased the opportunities for private investors. Private players are participating in designing, building, advising on financing and maintaining infrastructure assets alongside governments.

Private investment has taken three routes – full private provision, public-private partnership, and private finance initiatives

Private investment in infrastructure has occurred via the following routes:

- Full Private Provision (FPP): In this case, the government transfers the complete ownership of the asset to private players. The government assumes no responsibility of risk.
- Public-private Partnership (PPP) Schemes: In the case of PPPs, the investment is funded and operated through a partnership between the government and one or more private sector players.
- Private Finance Initiative (PFI) Schemes: PFI schemes introduce the benefits of private sector management and finance into public sector projects. It differs from privatisation as the responsibility of providing essential services to the public is not transferred to the private sector.

Figure 28 provides an outline of these options.

Fig 28 Schematic outline of FPP, PPP and PFI schemes

Type of scheme	Example of scheme	Advantages to private sector	Disadvantages to private sector	Advantages to public sector	Disadvantages to public sector
FPP Scheme	Channel Tunnel	Full control of project; limited regulation	Full risk exposure; possible need to transfer project at end of agreed concession period	Transfer of all risk; retain some rights to asset at end of concession period	Residual risk of failure; lack of control over prices etc, unless regulatory structure
PPP Scheme	Channel Tunnel Rail Link; London Underground Modernisation	Agreed framework for payment received	Little or no ownership rights	Retention of ownership and control; all rights to the asset revert at end of agreed payback period	Cost of payments; retention of risk elements
PFI Scheme	DBFO Road schemes; Urban rapid transit (tram) systems	Greater control over project management; some risk retained by public sector	Value of project depends on correct forecasting of costs and revenue streams; need to return asset to public sector at agreed end of franchise	Transfer of (some) risk; lower overall cost of project; typically receive asset at end of agreed payback period	Retention of some risk; need to fix payment for services to be delivered over long life of project

Source: World Bank, August 2006

Increased privatisation by FPP

Under an FPP model, the private sector provides infrastructure and is subject to government regulation. For example, in Australia, all universities were once owned and operated by the government. However, during the 1980s, the government allowed the private sector to build and operate universities such as the Bond University. The university is fully funded through the fees it receives from its Australian undergraduate and international students.

In the health sector, the Australian government owns and operates hospitals in all cities and major towns. However, it has permitted the operation of private hospitals which compete with government hospitals. The education sector is one area where the FPP model is much more common.

However, a FPP model is rarely used as even when there is public sector involvement on an infrastructure project, there is still ample scope for private sector aid.

Increased privatisation by PPP

"I have to be very positive about the future of PPPs. I don't think there's a panacea, I don't think there's a pot of gold, but I think there is a tremendous amount to be gained by government going through this process." *George Spadoro, Mayor, Edison, New York*

PPP is a model which has its foundation in a long-term partnering relationship between the public and private sectors in order to deliver services. Under this model, the public sector essentially benefits from the efficient service models of private sector providers.

As an example of a successful PPP project, the concessions programme in Chile in 1993–2002 covered 44 contracted projects of a total value of US$5.7bn, representing almost 6.25% of the GDP in 2004[24].

In the UK, more than 500 public service projects worth €39.5bn have been procured on a PPP basis[25].

The Australian PPP market was estimated to be worth about US$6.8bn as of May 2005

However, the PPP model is yet to be fully adopted globally. The PPP market in Australia is still small, at a size of US$6.8bn (May 2005)[26]

In Singapore, the Public Utilities Board awarded a desalination plant to SingSpring on a Build-Own-Operate (BOO) PPP basis[27]. Under this, SingSpring has to supply 30m gallons of water per day, for a 20-year period, from 2005 to 2025. Yet another first of its kind PPP contract was given by Singapore Customs to CrimsonLogic Pte Ltd[28]. This is the first information technology-related PPP project by Singapore Customs to create a one-stop integrated logistics information port. The contract is for the development of software as well as the maintenance and operation of the system, for a 10-year period, from 2007 to 2017.

One of the best examples of a PPP in India is the recent contract which was awarded for the construction of the first metro link in Mumbai on a build-own-operate-transfer (BOOT) basis[29]. This suggests that the PPP model is meeting a variety of infrastructure needs.

It is expected that governments will now move towards more PPP financings. In the past, a dominant role in this context was taken up by economic infrastructure, as in the case of toll roads. However, the trend has now moved towards social infrastructure.

Increased privatisation by PFI

"PFI is now being used in schools. An investment programme worth US$3.8bn is underway to rebuild and refurbish more than 500 schools in the UK" *The Economist*

The key difference between PFI and conventional ways of providing public services is that under PFI, the public does not own the asset. The authority makes an annual payment to the private company that provides the building and associated services. It operates almost like a mortgage. A typical PFI project is owned by a company set up specially to run the scheme.

The PFI is an important part of the government's strategy for delivering high-quality public services.

[24] http://www.planejamento.gov.br/arquivos_down/seminario_fmi/Apresentacoes/2604/6Ellis_Juan.ppt#350,1,Slide 1

[25] http://www.demarest.com.br/anexos/Public-Private_Partnership_Law.DOC

[26] INSTO 3rd Annual Infrastructure Finance & Investment Conference, May 16, 2005

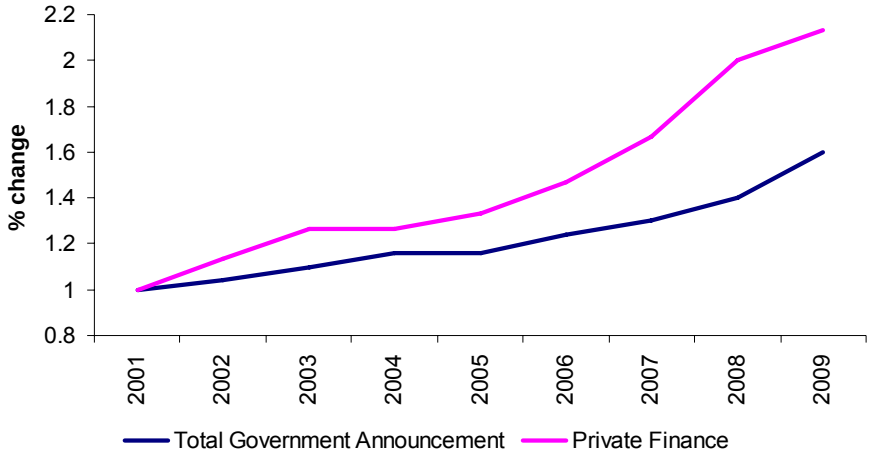
[27] http://www.mof.gov.sg/policies/ppp.html

[28] http://www.mof.gov.sg/policies/ppp.html

[29] http://www.expressindia.com/fullstory.php?newsid=69712

Figure 29 indicates the future potential of PFI in infrastructure in the key continental European markets of France, Italy, Spain and Portugal.

Fig 29 PFI in infrastructure in France, Italy, Spain and Portugal[30]



Note: Total Investments up to 2009 on an annualised basis; Private Finance share of investments at c. 30% of total
Source: PFI Magazine League Tables and Governmental Ministries of Infrastructure, August 2006

PFI in infrastructure is expected to increase by 50% by 2009 in France, Italy, Spain, and Portugal

As illustrated in Figure 29, PFI in infrastructure is expected to increase by approximately 50% by 2009 in the four key European countries of France, Italy, Spain and Portugal. Government expenditure is expected to grow from about €25bn in 2001 to almost €40bn in 2009, at a CAGR of 6.05%. The corresponding rise for PFI was from about €7.5bn in 2001 to €16bn in 2009, at a CAGR of 9.93%.

[30] Chart represents approximate values

Distinct characteristics appeal to investors

"Booming demand for infrastructure assets saw almost US$100bn raised globally to fund deals in the sector during the first half of 2006, a year-on-year increase of about 71%… Demand is being fed by the number of pension funds looking to infrastructure assets for stable, long-term returns that are higher than government bonds." *Financial Times, 19 July 2006*

Increased demand for infrastructure as an investment

The growing infrastructure investment gap and the trend towards privatisation of infrastructure assets have opened up opportunities for private investment. At the same time, shifts in the investment environment have created increased demand for infrastructure as an investment.

The global growth in the insurance industry and private and public pension provision has created demand for investments that deliver steady cash flow and predictable yields over the long term. Lower risk-adjusted returns from traditional investment channels, along with growing investor wealth, is driving investors to pursue alternate investment options.

Funds available for pension schemes are expected to rise rapidly

As more countries are moving toward compulsory pension schemes, the funds available for this are expected to rise rapidly. Figure 30 lists a few major countries with compulsory pension schemes.

Fig 30 Countries with mandatory pension funds and year of implementation

Country	Mandatory since
Australia	1992
Denmark	1964/1985
Finland	1956/1985
Hong Kong	2000
Hungary	1998
Iceland	1986
Korea	2005
Mexico	1997
Norway	2006
Poland	1999
Slovakia	2005
Sweden	2000
Switzerland	1982
Thailand	1998

Source: OECD: Pension Market in Focus – II, Asian Journal of Public Administration & International Labour Organization, August 2006

Pension funds currently represent a huge capital base. In 2005, the total institutional pension assets in 11 major markets grew by 17% to reach US$16.4tr.

Figure 31 illustrates the total assets with institutional pension funds for 11 major countries. The size of the pension fund in any country is related to the extent of labour market coverage. Most countries with a mandatory pension scheme have a large proportion of pension funds in relation to the size of their economy. For example, Iceland has a pension fund size of 112% of its GDP[31].

Fig 31 Estimated global pension fund assets (defined benefit & defined contribution) and growth rates

		Growth rates in local currency				
Country	US$bn	1-year (05)	5-year (00-05)	5-year (00-05) pa	10-year (95-05)	10-year (95-05) pa
US	8,123	7%	11%	2%	72%	6%
Japan	3,235	22%	36%	6%	83%	6%
UK	1,621	20%	33%	6%	123%	8%
Canada	1,022	14%	42%	7%	152%	10%
Netherlands	764	20%	85%	13%	206%	12%
Australia	592	17%	95%	14%	268%	14%
Switzerland	464	20%	70%	11%	179%	11%
Germany	287	19%	63%	10%	96%	7%
France	133	19%	68%	11%	146%	9%
Ireland	90	21%	92%	14%	312%	15%
Hong Kong	49	5%	57%	9%	144%	9%

Source: Watson Wyatt (http://www.watsonwyatt.com/europe/news/pressreleases/press.asp?id=15636), August 2006

Pension fund managers are increasingly looking to alternative investment channels to diversify their risk

With a higher asset base, pension fund managers are increasingly looking to diversify their risk by allocating a greater share of their portfolio to alternative investment channels that can provide medium to high returns with low to moderate risk.

Infrastructure, with the inherent characteristics of long duration assets and stable cash flows, is gaining importance amongst pension fund managers.

According to a research paper from the Parliament of Australia, in 2002, infrastructure investment by superannuation funds was estimated at US$8bn, or about 2% of the total fund assets, with a projected investment of about US$65bn or about 5%[32] of the total fund assets by 2012.

In Canada, the Ontario Teachers' Pension Plan, one of the largest pension funds in the country, managing US$82.4bn worth of assets, made investments in many infrastructure projects, including Scotia Gas Networks (a company managing the two largest regional gas distribution networks in the UK); Intergen (a portfolio of ten global power plants); Northumbrian Water Plc (a UK-based water company); and a few contracted power generation assets.

[31] OECD: Pension Market in Focus - II

[32] ABN–AMRO, Private Financing and Defence Infrastructure

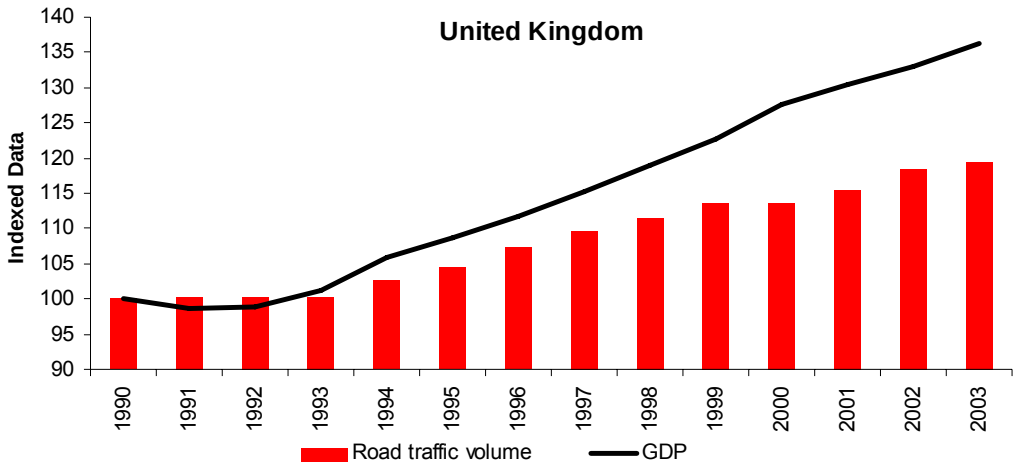
Stable, inflation-linked cashflow

Infrastructure as an asset class is gaining ground among investors thanks to its distinct characteristics.

The very long-term nature of infrastructure assets makes them particularly attractive to pension and insurance funds as, by investing in this asset class, these schemes are able to more closely match the duration of their assets with the duration of their liabilities. In addition, cashflows are usually stable and relatively protected against inflation and market volatility.

Figure 32 shows the growth in road traffic in the UK in 1990–2003. It illustrates that with the growth in the GDP of a nation, the corresponding road traffic volume also rises.

Fig 32 Historical road traffic growth in the UK



Source: DEFRA: e-Digest of Environmental Statistics, August 2006

In many cases, the underlying cashflow of an infrastructure asset is explicitly linked to inflation

In many cases, the underlying cashflow of an infrastructure asset is explicitly linked to inflation. Regulated utilities have a regulatory pricing formula that specifically allows for an inflation-related adjustment – the 'CPI – X' formula. With Airports, the aeronautical charges (majority of an airport's revenues) typically make allowance for an inflation adjustment. With airports, the aeronautical charges (majority of an airport's revenues) make allowance for an inflation adjustment.

Toll roads generally have a pricing mechanism defined in a concession, which typically contains a reference to the level of inflation. For example, once the planned Western Sydney Orbital opens to traffic in 2006, motorists will have to bear quarterly rises in the toll fee. Instead of the annual or once-in-two-year increases, toll road operators will review prices every three months to keep pace with inflation.

Infrastructure as an asset class

Infrastructure can broadly be categorised into three components – economic infrastructure, social infrastructure, utilities and commercial infrastructure

Infrastructure assets can be defined as physical structures and networks that are used for performing long-term capital activities and which provide essential services to the public and community. This definition includes assets such as roads, railways, airports and ports as well as power, telephone, water and sewerage systems.

A broader definition of infrastructure includes housing, health and education services and other social institutions that facilitate economic and social interaction. These tangible assets, along with the organisations that run them, are viewed as essential drivers of any economy as basic infrastructure is a precondition for sustainable economic and industrial development.

Infrastructure can be categorised broadly into three components: economic infrastructure; social infrastructure; and utilities and commercial infrastructure.

Economic infrastructure

Services used in production processes and final consumption in the economy

Economic infrastructure includes assets that provide services used in production processes and final consumption in the economy. These are assets that are required for economic growth and involve a high initial cost outlay. They usually have a long operational life and show monopolistic characteristics, which generally means they have a high degree of price regulation. It is relatively easy to price or value gains for this component in economic or financial terms. Typical assets would be transport, telecommunications and utilities such as electricity, gas and water. In Australia, economic infrastructure represents 70% of the total infrastructure value.

Social infrastructure

A system of networks and facilities supporting the people and the community

This component comprises a system of networks and facilities supporting the people and the community. These assets are usually operated within the private sector and are used to support and provide public services such as hospitals, education, housing, recreation and leisure. Social infrastructure also includes systems such as the legal system, culture and capital markets. Investment in social infrastructure generally involves long-term contracts between the public and private sector with high potential leverage. Gains here are less tangible and can be more difficult to price or value in economic or financial terms.

Commercial infrastructure

Offshoot of the infrastructure asset class

Commercial infrastructure is a recent offshoot of the infrastructure asset class. This segment comprises assets for which the benefits of sharing infrastructure outweigh the competitive advantage of owning and operating one's own infrastructure. It is typically found in sectors in which governments have found that they have better pricing power by allowing greater competition through widely held licences. This component is characterised by a high degree of competition and includes assets such as satellites, cable networks, and mobile phone towers.

Figure 33 illustrates the various asset classes with the help of examples.

Fig 33 Components of infrastructure asset classes

Economic infrastructure (often government owned)	Social Infrastructure	Commercial Infrastructure (often private owned)
Toll roads	Hospitals	Satellites
Gas – pipelines, distribution, storage, distribution facilities		
Bridges	Schools	Mobile phone towers
Electricity – distribution, generation, transmission		
Tunnels	Recreation and leisure	Terrestrial transmission assets
Water – pipeline, water, sewage treatment ,distribution and desalination plants		
Sea ports	Prisons	Cable networks
Communications – towers, conduits, transmission, networks, satellites, cable networks		
Airports	Stadiums	Fibre networks
Cable networks		
Rail	Courts	Rail Networks
Satellite systems		
Ferries	Subsidised housing	

Source: Evalueserve Analysis, August 2006

Fundamental features

Though the definition of infrastructure encompasses a broad range of assets, when combined, they exhibit a few common traits.

- Essential services with relatively inelastic demand
- High barriers to entry
- Longer-duration assets
- Capital intensive
- High degree of regulatory control

Each of these traits is discussed below:

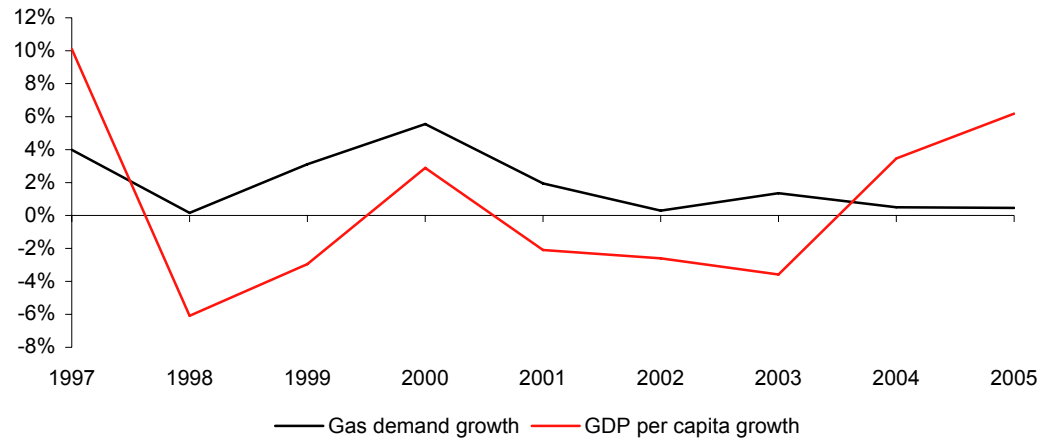
Essential services with relatively inelastic demand

Infrastructure assets provide basic services, which have relatively inelastic demand

Infrastructure assets provide basic, irreplaceable, and essential services, which means that they benefit from relatively inelastic demand. Despite growth turnabouts, the demand for many infrastructure assets is extremely stable.

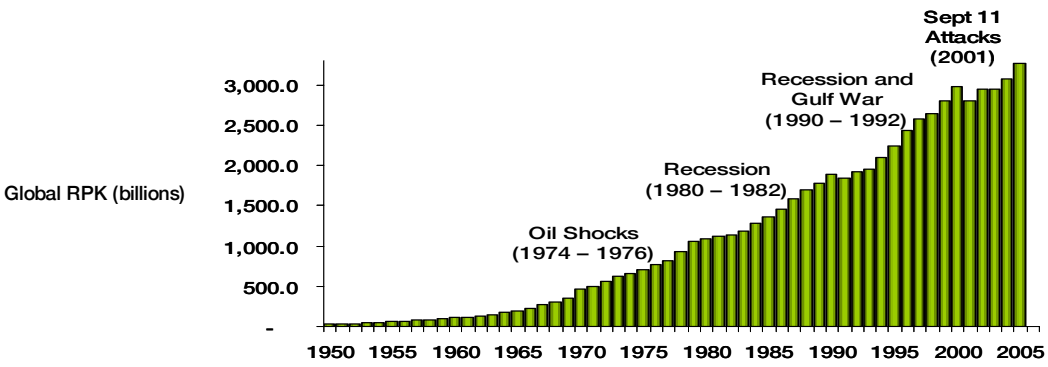
A good example of this is gas and electricity usage, which tends to grow steadily year on year, often despite economic downturn. As shown in Figure 34, gas demand grew steadily year on year at rates between 0% and 6% pa over the past ten years in Hong Kong despite the fact that the period experienced some economic downturns (as seen in the negative per capita GDP growth). Similarly, despite major economic and political events, travel volumes have continued to increase steadily over a long period. As seen in Figure 35, global air traffic has continually increased, even during economic and political downturns, and, like gas and electricity, revenues are largely dependent on travel volumes.

Fig 34 Gas demand growth and GDP growth – Hong Kong 1996–2005



Source: Macquarie Research, August 2006

Fig 35 Global historical air traffic growth (1950–2005)



Source: International Civil Aviation Organization, August 2006

High barriers to entry

Infrastructure projects mostly require a high initial investment but subsequently require low capital expenditure once operational

Infrastructure projects mostly require a high initial investment. For example, the Beijing-Lhasa Express, which is the world's highest railway, cost US$4.2bn. Infrastructure projects subsequently require low capital expenditure once they begin operations. High economies of scale, which accrue in the later stages of an asset's life, serve as a barrier to entry for new competitors, as most businesses find it difficult to wait for long periods to seek returns on investments. Infrastructure assets, therefore, exhibit the characteristics of a natural monopoly and generally face little or no competition.

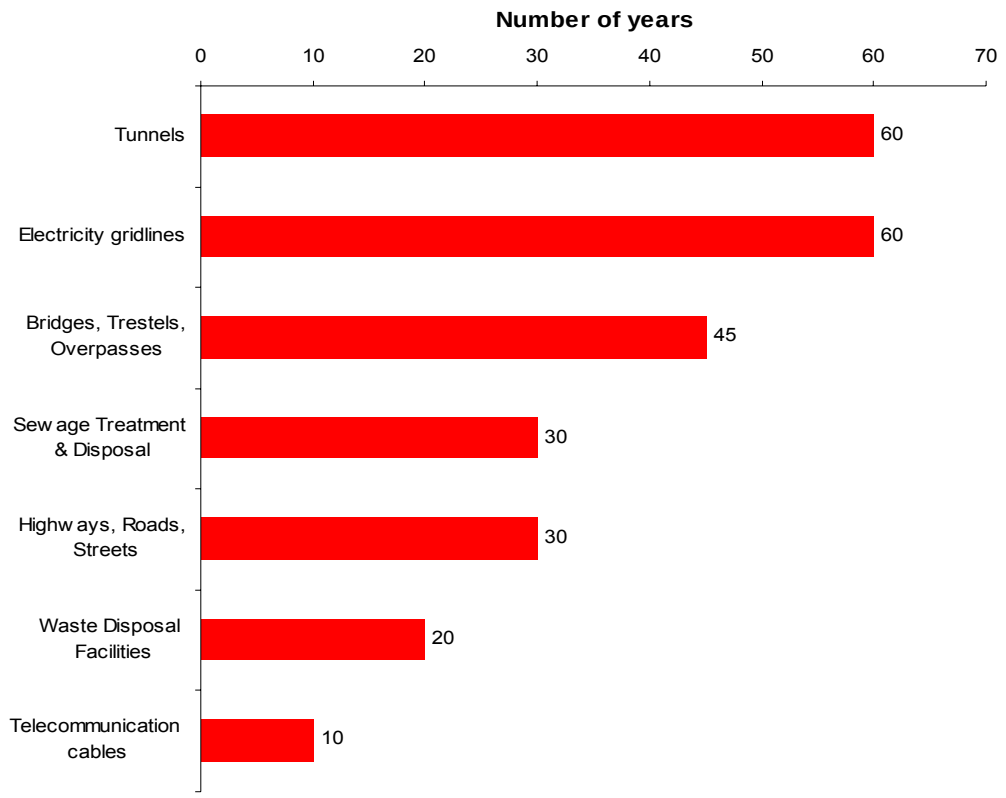
Another example where a high barrier to entry leads to a natural monopoly-like situation is the distribution of piped water to residential neighbourhoods. Underground pipes, which usually last fifty years or more, have strong economies of scale because it is more economical to serve all the households on a street from a single pipe, rather than from two or three competing parallel pipes. One pipe is cheaper, as the cost of digging and back-filling the trench for the pipe and the cost of the pipe itself does not increase proportionately with the pipe's capacity. Moreover, the alternatives to piped water such as private wells, tanker trucks, or bottled water, are usually more expensive and less convenient. As a result, a local piped water company often faces little effective competition and could price its services well above costs.

Longer-duration assets

The life span of an infrastructure asset can extend to hundreds of years, depending upon the asset type, maintenance and technological progress. Usage is usually based on long-term agreements, which often last for more than 30 years. Figure 36 illustrates the lifespan of some assets before major maintenance is required.

Infrastructure returns are generally stable as they are least affected by economic volatilities

Fig 36 Life of infrastructure assets before major maintenance is required



Source: Macquarie Research, August 2006

Capital intensive

Highways, airports, ports, utility distribution systems, railways, water and sewer systems, and communications networks are generally highly capital-intensive

Infrastructure investment in projects such as highways, airports, ports, utility distribution systems, railways, water and sewer systems, and communications networks are generally highly capital-intensive with long investment gestation periods.

As an example of the amount of capital investment required, In the US, between 1981 and 2002[33], US$49bn[34] was spent on improvements to railroads and maintenance of track and equipment. Capital expenditure rose by 56% from US$3.6bn in 1990 to US$5.7bn in 2002. Estimates suggest that to maintain the current share of freight carried and anticipated increase in total freight carried, railroads require US$175-195bn in investments over the next 20 years.

High degree of regulatory control

Infrastructure assets are highly regulated, creating natural and high barriers to entry

Infrastructure assets are often regulated as they are engaged in providing essential services to the public and a country's economy. Regulations generally benefit infrastructure investments because they create high barriers to entry as well as in certain situations government payments or guarantees, leading to protected returns for an investor.

In India, energy industries have always been highly regulated to ensure fuel was available and affordable to all customers across the country. The government regulated fuel prices in the marketplace and returns for companies were regulated under the retention pricing mechanism. India-based Oil and Natural Gas Company (ONGC), which operates in a regulated environment, has recently signed a gas sales agreement with GAIL Ltd for 15 years. As a part of this agreement, the price of gas will be determined by the government's gas pricing order. As a highly regulated monopoly, ONGC has maintained its position as one of the most profitable companies in India for FY05–06. ONGC's net profit grew at a CAGR of 25% pa for the period 1997–2006.

High barriers to entry due to regulation and cost mean that for many infrastructure assets there is little or no competition.

Governments looking to reduce their involvement in infrastructure provision can offer incentives to the private sector by, for example, guaranteeing a minimum level of revenue at times when demand is lower than expected. In the Colombian El Cortijo-El Vino toll road project, the government decided to reimburse the concessionaire if traffic was less than 90% of the specified level. It also undertook a minimum-revenue guarantee when it awarded a build-operate-transfer (BOT) contract for a new runway at Bogota's El Dorado airport.

Risk/return profiles

Risk/return profile can be broadly categorised on the basis of industry regulations and the stage of the asset lifecycle

The risk/return profile of an investment in infrastructure can be broadly categorised on the basis of industry regulations and the stage of the asset lifecycle.

Industry regulation

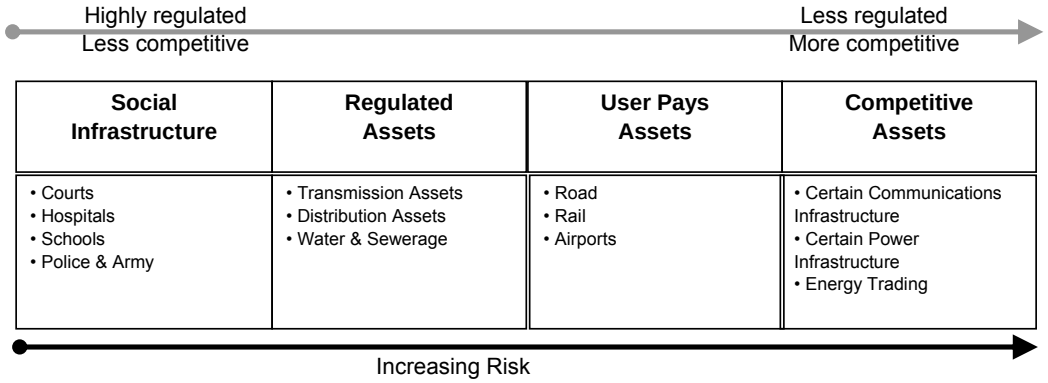
The risk-return profile of any investment option depends on the type of industry in which the investment is made and the extent of regulation of that industry. Any industry that is highly regulated displays monopolistic characteristics and ensures a regular stream of income with high pricing power. This means that risk increases with a decrease in regulation as competition increases alongside. Conversely, risk levels decrease with an increase in industry regulation.

[33] http://www.fra.dot.gov/downloads/policy/freight5a.pdf

[34] http://www.asce.org/reportcard/2005/page.cfm?id=29

For instance, in 1999, regulations in the energy sector of France were relaxed and some large firms were allowed to choose their energy supplier. The state-owned electricity group of France, Electricité de France (EdF) was exposed to higher market risk since the regulations in the industry were relaxed. EdF's supply business felt the adverse effects of competition and its market share fell to around 80% from the earlier 95%. With the sector being liberalised further, it is expected that the risks for EdF will further increase.

Fig 37 Correlation between regulation and risk



Source: Macquarie Research, August 2006

Highly competitive infrastructure assets face high risk

As illustrated in Figure 37, highly competitive infrastructure assets face high risk. For instance, in the US, competition in local telecommunications services was introduced in 1996 when the new Telecommunications Act was implemented. Long distance communication service was made competitive in 1984, after the divestiture of AT&T. This highly competitive industry exposed the players in the market to much higher risk. AT&T, which was the market leader at that time with 100% market share, has lost more than 50% of the market share since then.

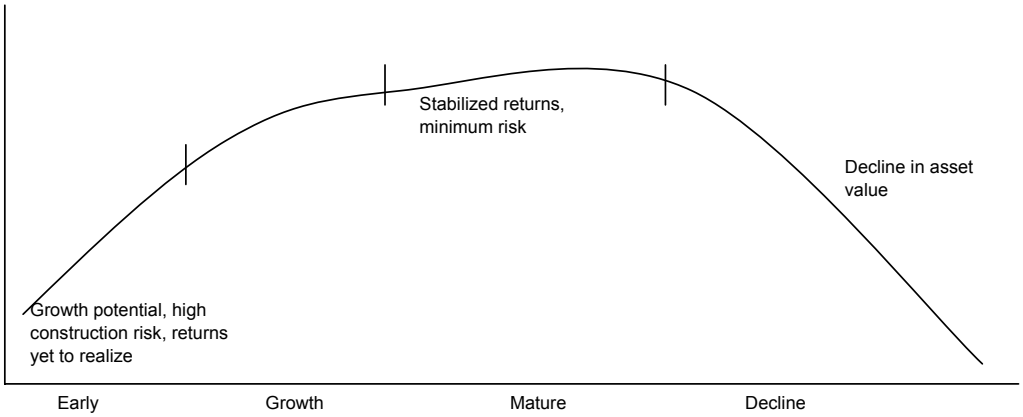
Stage in the asset lifecycle

The stage or phase of asset maturity at which the investment is made is yet another important factor. The construction or developing phase is characterised by higher risk (both business and financial), uncertain demand patterns, high capital growth, low leverage and an unpredictable stream of income.

As an asset matures and enters a developed phase, the risk declines and value increases

As illustrated in Figure 38, as an asset matures and enters a developed phase, the risk declines and value increases. At this matured stage, assets are generally more defensive in nature. This stage generally displays the characteristics of a regular stream of income, lower risk, clarity on regulations, established demand patterns, low capital growth, etc. Investors expecting a regular stream of income with low volatility generally invest in later stages.

Fig 38 Stages in an asset lifecycle



Source: Evalueserve Analysis, August 2006

Infrastructure vs other asset classes

Benchmarking infrastructure – introducing MGII

The unique characteristics of infrastructure make comparisons difficult

Due to the unique characteristics of infrastructure, comparing it against the benchmark of any other asset class is inappropriate.

The Macquarie Global Infrastructure Index (MGII), introduced by Macquarie and FTSE in July 2005, provides investors and asset managers a global benchmark to measure the performance of infrastructure. The index uses a broad definition of infrastructure which includes those companies that provide or are involved in providing services that are essential for the growth and development of the community.

Constituents

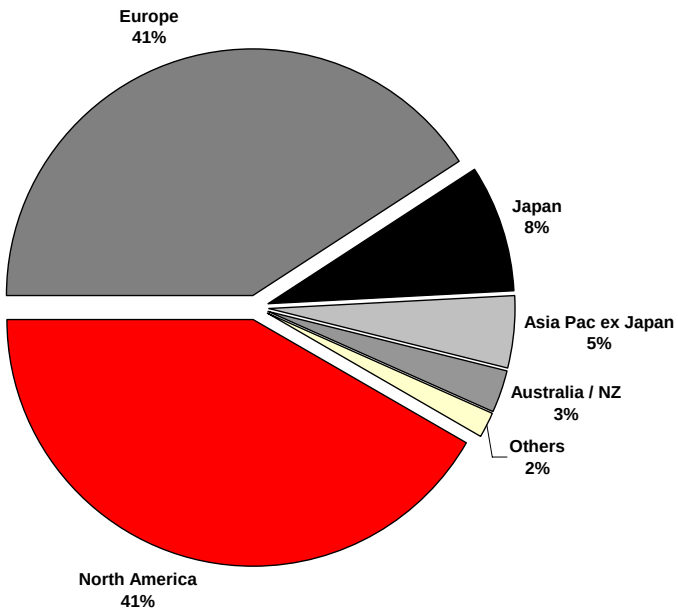
The MGII comprises a broader range of infrastructure stocks than is currently available in existing indices. It observes the growth of both infrastructure (economic, social and commercial) and utilities (electric, gas, water).

MGII comprises stocks in FTSE Global All-Cap Index that have operations in the infrastructure and utilities domain. It is further broken down into sub-indices on the basis of regions (Europe, Japan, Australasia, and the US) and sectors (water, transport services, pipelines, multi-utilities, gas distribution, electricity and telecommunications hardware). As of March 2007, MGII had 236 constituents in the broader index with a combined market capitalisation of US$1,758bn.

Figure 39 illustrates a geographical breakdown of the MGII index using a universe of 236 infrastructure companies. It also shows the sub-indices of MGII categorised on the basis of countries.

North America forms the largest share of MGII at 41%

Fig 39 Geographical breakdown



Source: Bloomberg, Macquarie Bank Limited, April 2007

Figure 39 indicates that North America and Europe form the largest share of this index, followed by Japan and Asia Pacific at 8% and 5%, respectively. This points towards the growing importance of European and North American infrastructure equities.

The distinct characteristics of infrastructure and increasing interest amongst investors led to introduction of MGII as a benchmark to measure infrastructure performance

Key characteristics of each asset class

Figure 40 outlines, at a broader level, the inherent distinguishing characteristics of the various asset classes and how they compare against each other.

Fig 40 Comparative analysis of characteristics of asset classes

FACTORS	EQUITIES[35]	BONDS	EMERGING MARKETS[36]	CASH	INFRASTRUCTURE
Definition	Interest of owner (common and preferred) in the company	A promise to repay the principal along with the interest on a specified or maturity date	Developing countries with growing financial markets	Money in the form of currency, bills, deposit accounts, money market securities, etc	Assets that are used on a long-term basis, providing essential services to the public or community
Income	High capital gains with low fixed income	High fixed income with low capital gains	High capital gains with low fixed income	Low capital gains	At developing stage: Low capital gains with low fixed income (and volume growth); at maturity stage: High fixed income with low capital gains.
Volatility	High	Low	Very high	Very low	Moderate
Liquidity	High	High	Market dependent	Very high	Moderate, but mostly long-term horizon

Source: Evalueserve Analysis, August 2006

As illustrated in Figure 40, infrastructure as an asset class has a distinct profile and should therefore not be considered as an extension of any of the existing asset classes.

Infrastructure is hybrid in nature as it reflects features of both bonds and equities. It has a long-term investment horizon and provides stable fixed income, a characteristic similar to bonds. However, infrastructure assets provide equity-like returns with moderate volatility, moderate to low liquidity and upside growth potential. Its distinct profile enables it to provide greater diversification benefits to an investor compared to traditional types of investments.

Comparing performance – quantitative analysis

Infrastructure has shown some degree of immunity to factors that otherwise affect global equity markets

This section presents a quantitative analysis of infrastructure as an asset class by comparing it with traditional investment strategies.

For the purposes of this study, the following representative indices were chosen for each asset class as they best defined their attributes. MGII has been used as a proxy for infrastructure and its performance has been compared with four other asset classes, ie, emerging markets, equities, bonds and cash. For the period 1994 to 2000 a proxy for the MGII was used. This proxy was comprised of all stocks in the FTSE Global Index from the same industry classes as the MGII. In other words, it is a less specific set of stocks. However, this negative is balanced by the fact that there were fewer specific infrastructure stocks to select from in that period. The risk and return profiles of these asset classes were studied over a period of 13 years from 1994 to 2007.

Fig 41 Asset classes studied

Asset class	Proxy / representative index
Emerging markets	FTSE All-World Emerging Index
Equities	FTSE All-World Developed Index
Bonds	CGBI WGBI WORLD ALL MATS (US$)
Cash	JPM GLOBAL CASH (US$)
Infrastructure	Macquarie Global Infrastructure Index (MGII) and a composite index created from select FTSE indices

Source: Macquarie Research, April 2007

[35] Equities in developed market

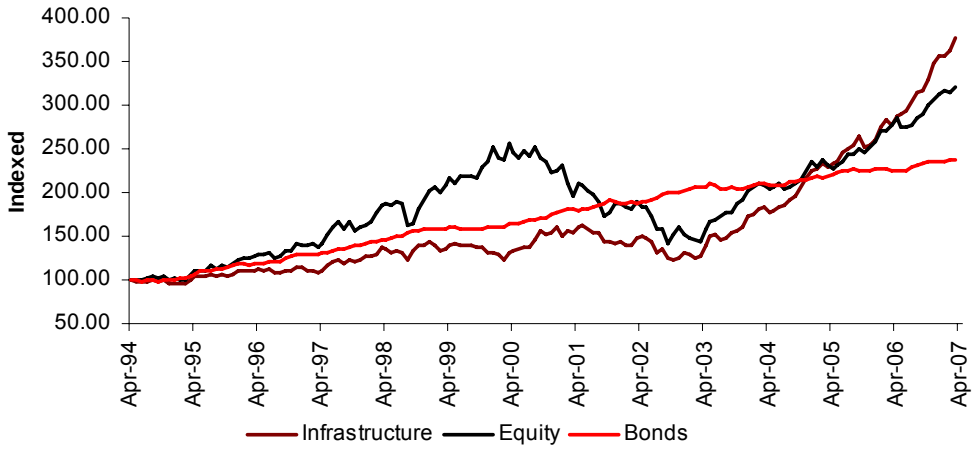
[36] Includes equities

Performance against major asset classes

Over the last six years, the MGII has grown from US$466bn to approximately US$1,758bn, as of March 2007. Infrastructure generated an average annual return of 7.81% (log normal real returns) from 1994 to 2007, compared with 4.04% for bonds and 6.64% for global equities.

Figure 42 compares the performance of infrastructure against bonds and equities.

Fig 42 Infrastructure vs bonds & equities (total return US$)[37]



Source: Bloomberg, Macquarie Bank Limited, April 2007

Infrastructure has provided similar returns to equity over the last 12 years, at a lower volatility

As illustrated in Figure 42, infrastructure has provided similar returns to that of equity over the last 13 years at a lower volatility. Since April 1994, infrastructure has earned a nominal return of 10.93% pa, compared with 9.63% pa for equities and 6.82% pa for bonds.

Since bottoming out in September 2002, equities and bonds have generated total nominal returns of 128% and 19%, respectively. During the same period, infrastructure generated returns of 204%. Infrastructure has therefore performed competitively when compared to traditional investments such as equities and bonds both in the short and the long term.

Distinctive returns

The following analysis was conducted using the following two parameters to further demonstrate the distinctive investment features of infrastructure as an asset class:

- Risk-return profile
  - ⇒ Absolute returns
  - ⇒ Risk-adjusted returns
- Correlation analysis

Risk-return profile

A risk-return profile analysis was performed to understand the difference in risks and returns of infrastructure compared with other asset classes. This was done by calculating the absolute risk-return and also by using risk-adjusted return.

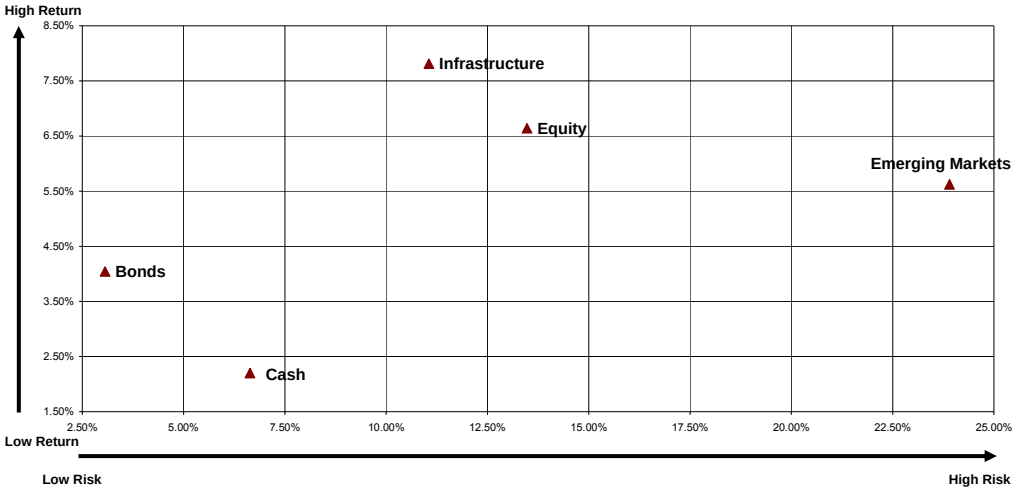
[37] Figures derived from respective indices; nominal returns; total return data rebased as of April 1994

Absolute risk-return

The risk-return profiles of different asset classes over a period of 13 years from 1994 to 2007 are presented in Figure 43. The performance of infrastructure was compared with four other asset classes - emerging markets, equities, bonds and cash. It can be observed that infrastructure has performed better than all other asset classes.

Infrastructure offers the same level of return as equities at a lower level of risk

Fig 43 Risk-return profile of five asset classes[38]



Source: Evalueserve Analysis, April 2007

Figure 43 indicates the risk-return profiles of various asset classes. The asset classes are compared on the basis of the average annual returns, along with the associated risk, generated over the 13-year period from 1994 to 2007.

As illustrated in this Figure, infrastructure generated an average annual return of 7.81% (log normal real returns) from 1994 to 2007, compared to 4.04% for bonds and 6.64% for global equities during the same period.

Infrastructure has generated higher returns than equities. Moreover, the risk, as measured by standard deviation, is substantially less for infrastructure at 11.05% compared to that of equities at 13.48%.

Bonds and cash, due to their inherent characteristics, have generated lower returns of 4.04% and 2.20%, respectively, along with low standard deviation of 3.06% and 6.64%, respectively.

Emerging markets lies on the extreme right of the graph, illustrating the high risk nature of this asset class. Although its standard deviation is the highest amongst all asset classes at 23.90%, it has not been able to justify the higher risk with higher returns. Emerging markets has generated average returns of 5.62%, which is much lower than that of infrastructure and equities.

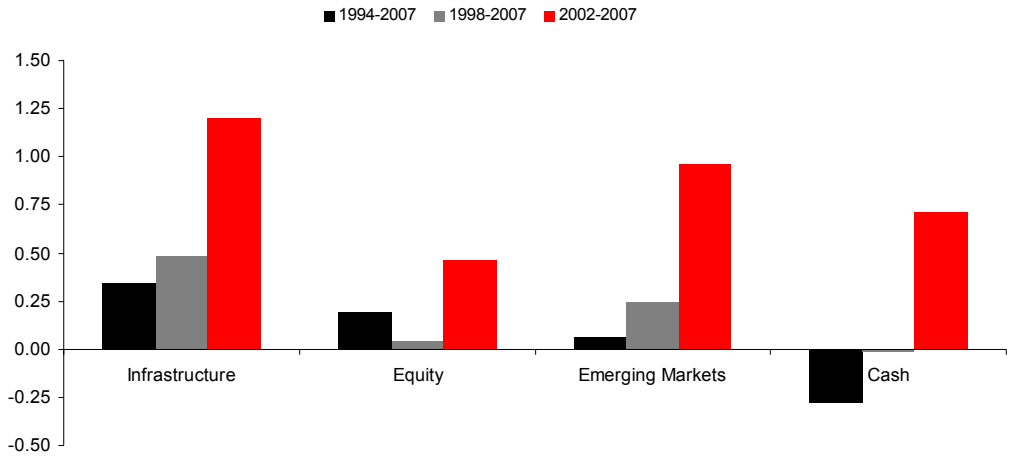
[38] Methodology

- The performance (risk-return profile) of infrastructure and other asset classes was examined over a 13-year, period from 1994 to 2007.
- Risk is measured by standard deviation.
- Since no single index covers this entire period for infrastructure, two indices, as mentioned in Figure 33, were combined for the purpose of the analysis.
- The study was restricted to 13 years because of the lack of an available representative infrastructure index prior to 1994.

Risk-adjusted returns

Return profiles for all asset classes were examined after being adjusted for their respective risks (see Figure 44).

Fig 44 Risk-adjusted returns on various asset classes for different time periods[39]



Source: Evalueserve Analysis, April 2007

Infrastructure performed better over a longer period than most other asset classes

The study shows that infrastructure earned the highest risk-adjusted returns over the 13-year period. Infrastructure generated a Sharpe ratio of 0.34 over a 13-year period, compared to 0.19 for equities, and 0.07 for emerging markets. This indicates that infrastructure is able to justify its volatility better with higher returns, compared to equities, emerging markets and cash.

On a risk-adjusted return basis, the superior performance of infrastructure over most other asset classes is due to a combination of two factors: better returns and lower volatility which can be attributed to the inherent characteristics of this asset class, such as inelastic demand, high barriers to entry, inflation linked cashflow, high degree of regulation and long duration of assets. As a result of these factors, infrastructure is able to generate higher and more stable cashflow.

Based on a summary of the two approaches discussed above, infrastructure has performed better than traditional investments such as bonds and equities.

[39] Methodology

- The analysis was extended by considering three blocks of time (13 years, 9 years, and 5 years) to examine the full impact of the study.
- Risk-adjusted returns were calculated using the Sharpe ratio, which gives the risk premium earned above risk-free rate, per unit of risk taken.
- Long-term bond returns are taken as a measure of the risk-free rate.

Low correlation delivers diversification benefits[40]

Portfolio optimisation theory suggests that the addition of a new asset to a portfolio will not diversify the risk if the new asset is highly correlated with other assets in the portfolio. This section explores the degree of correlation between the various asset classes.

Fig 45 Case 1: 13-year correlation

	Infrastructure	Equity	Emerging markets	Utilities	Cash	Bonds
Infrastructure	1.00					
Equity	0.58	1.00				
Emerging markets	0.45	0.74	1.00			
Utilities	0.67	0.40	0.35	1.00		
Cash	0.35	0.16	0.09	0.22	1.00	
Bonds	0.14	(0.10)	(0.18)	0.09	0.10	1.00

Source: Evalueserve Analysis, April 2007

Fig 46 Case 2: 9-year correlation

	Infrastructure	Equity	Emerging markets	Utilities	Cash	Bonds
Infrastructure	1.00					
Equity	0.52	1.00				
Emerging markets	0.43	0.78	1.00			
Utilities	0.70	0.39	0.36	1.00		
Cash	0.40	0.21	0.17	0.26	1.00	
Bonds	0.09	(0.26)	(0.26)	0.04	0.25	1.00

Source: Evalueserve Analysis, April 2007

Fig 47 Case 3: 5-year correlation

	Infrastructure	Equity	Emerging markets	Utilities	Cash	Bonds
Infrastructure	1.00					
Equity	0.69	1.00				
Emerging markets	0.66	0.84	1.00			
Utilities	0.75	0.52	0.59	1.00		
Cash	0.43	0.17	0.14	0.26	1.00	
Bonds	0.20	(0.22)	(0.15)	0.13	0.32	1.00

Source: Evalueserve Analysis, April 2007

Infrastructure has shown low correlation with other asset classes, which has decreased over time

The analysis suggests that there is a low correlation between infrastructure and other asset classes. As discussed earlier, infrastructure as an asset class is hybrid in nature and thus provides the benefits of moderate to high returns with low to moderate volatility. The distinctive characteristics of infrastructure such as inelastic demand, high barriers to entry, inflation-linked cashflow and high degree of regulation, makes this asset class react differently to changing market scenarios than other asset classes. Therefore, the inclusion of infrastructure as a distinct asset class within a portfolio is expected to provide diversification benefits.

[40] Methodology

- Analysis was extended by considering three blocks of time to examine the full impact of the study.
- A correlation of monthly returns of various asset classes was drawn, considering time periods of 13 years (Fig 37), 9 years (Fig 38), and 5 years (Fig 39), respectively.
- 'Utilities' was included to establish the difference between utilities and Infrastructure asset classes.

In addition, it was observed that the correlation between infrastructure and other asset classes has decreased over time. This can again be attributed to the inherent long duration characteristic of infrastructure assets. The total return potential of infrastructure assets is realised over a long period unlike the other asset classes. This indicates that exposure to infrastructure for a longer duration heightens the portfolio diversification advantages.

Infrastructure has shown a correlation of 0.58, 0.45, 0.35, and 0.14 with equities, emerging markets, cash and bonds, respectively, over the last 13 years. Infrastructure exhibited a relatively low correlation with cash and bonds. This implies that infrastructure can provide diversification benefits as well as boost returns in a portfolio dominated by fixed income securities. It can also provide diversification without substantial loss of returns in a portfolio dominated by equities.

The results have also shown that infrastructure could be viewed as a different asset class from utilities despite the fact that utilities comprise a majority of those assets which are a part of infrastructure. Correlation to pure global utilities is 0.75 over four years reducing to 0.67 over 12 years.

As stated earlier, over the long term, the correlation of infrastructure with other asset classes has declined. This implies that infrastructure does not have a linear relationship with other asset classes and moves independently. This independence of infrastructure from other asset classes makes it a shock absorber in a portfolio during a downturn. Due to its low correlation, negative or low returns from other asset classes may be compensated by moderate to high returns on infrastructure, thus providing a cushion to the portfolio.

Infrastructure in a portfolio – more return, less risk

Markowitz portfolio optimisation theory has been used to summarise the impact of infrastructure on a portfolio by constructing efficient frontiers

The above analysis shows that infrastructure can provide a stream of regular returns with moderate risk, and that it exhibits low correlation with other mainstream asset classes.

Portfolio optimisation theory suggests that adding a new asset class to a portfolio will diversify the risk if the new asset class has a low correlation with the other asset classes in the portfolio. An investor will typically invest in an asset class if it is able to provide diversification benefits to the portfolio.

The objective of the following research is to examine the effect of including infrastructure within an investor's portfolio. The impact of adding infrastructure to a portfolio and impact on risk and returns can be established by constructing efficient frontiers using the Markowitz theory of portfolio optimisation.

In order to identify the 'efficient frontier', a universe of portfolios with different risk-return profiles can be constructed using various assets in different proportions. These various optimal portfolios with different risk-return profiles when plotted on a graph provide a curve, which is called the efficient frontier. Markowitz portfolio optimisation theory allows us to construct a portfolio that offers maximum returns at a given level of risk or conversely, minimises the risk for a given level of return.

The three basic inputs, discussed above, required to create an efficient frontier[41] are:

- Mean returns on various asset classes available.
- Risk or volatility on these returns.
- Covariance or correlation between returns on these asset classes.

Efficient frontier analysis

To assess the impact of infrastructure on a portfolio's risk-return profile, two efficient frontiers were plotted on the same graph. The first efficient frontier was plotted with the assumption that infrastructure is not available as an investment option; while the second one was based on the assumption that investment in infrastructure is possible.

The annualised risk and return for the last 13 years, as summarised earlier, and covariance[42] between the asset classes' returns were used to construct the efficient frontiers. The portfolio consisting of equities, bonds, cash and emerging market was optimised at a desired level of return to obtain minimum risk levels, and the efficient frontier was plotted.

Infrastructure was then added to the portfolio and another efficient frontier was drawn to demonstrate the effect of the inclusion.

[41] Methodology:

- To obtain the required inputs, sample data of total index returns for 13 years, from April 1994 to March 2007, was studied.
- This sample consisted of historical monthly total return index values for five asset classes, namely cash, bonds, equities, emerging markets and infrastructure.
- The MGII was used to calculate returns on the infrastructure asset class.
- The log normal nominal returns on various asset classes were calculated for a given period using the Total Return Index Values.
- Using inflation data, all the nominal returns were converted into real returns. Inflation data used to normalise the returns was monthly. Hence, the returns were normalised for the respective period.

[42] Covariance analysis is provided in the Appendix.

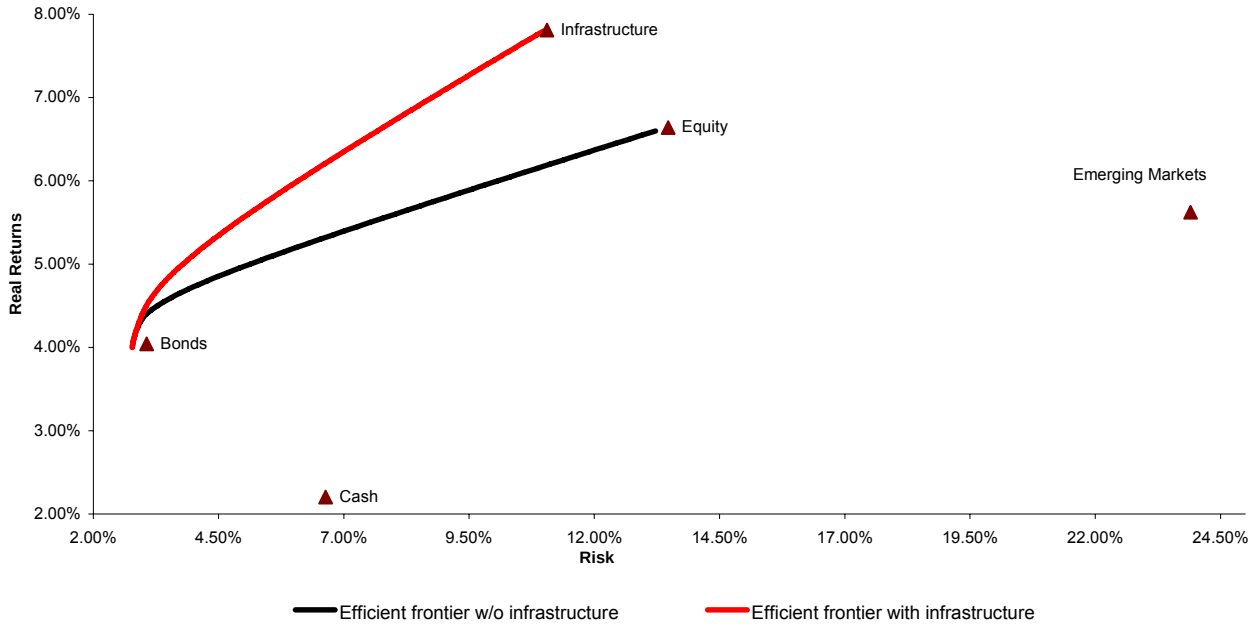
Figures 48 and 49 illustrate the risk, as measured by standard deviation, for a diversified portfolio at various levels of returns. The detail of the returns at corresponding levels of risk has been furnished in the appendix.

Fig 48 Risk-return levels for a diversified portfolio

Diversified efficient portfolios		
Real returns	**Std dev with infrastructure**	**Std dev without infrastructure**
4.00%	2.78%	2.78%
4.20%	2.85%	2.86%
4.40%	2.98%	3.06%
4.60%	3.16%	3.56%
4.80%	3.44%	4.28%
5.00%	3.79%	5.13%
5.20%	4.19%	6.06%
5.40%	4.63%	7.03%
5.60%	5.09%	8.03%

Source: Macquarie Research, April 2007

Fig 49 Efficient frontiers with emerging markets, cash, equities and bonds (13 years)



Source: Evalueserve Analysis, April 2007

Addition of infrastructure to a portfolio results in higher returns at the same level of risk

The analysis shows that the efficient frontiers have shifted to the left when infrastructure is added to the portfolio. With the same level of risk, the portfolio including infrastructure offers higher returns vis-à-vis a portfolio without infrastructure.

This shift to the left is explained by the fact that infrastructure, with to its low covariance with other asset classes, improves the efficiency within the portfolio and offers diversification benefits. These factors reduce volatility in the portfolio returns, ie, reduce risk at each level of return.

Case study on infrastructure in a pension fund portfolio

There is growing relevance of infrastructure as an investment option for pension funds

A number of attributes of infrastructure highlighted by the analysis above suggest that this asset class matches the long-term investment needs of investors such as pension funds and insurance companies while providing diversification benefits for shorter-term investors.

In light of the growing relevance of infrastructure as an investment option for pension funds, we studied its impact on a pension fund portfolio. Pension funds generally have a low-risk profile as they prefer investing in secure, income-yielding instruments.

Figure 50 outlines the structure of pension funds from different countries. The table shows that debt and cash constitute a major portion of pension fund investment indicating a low risk tolerance.

Fig 50 Structure of pension fund assets in 2004 (in %)

Country	Cash and deposits	Other debt instruments including loans	Shares	Other investments
Canada	5.0	24.1	23.6	47.3
Denmark	0.3	60.8	19.8	19.0
Germany	2.6	57.2	32.2	8.0
Netherlands	2.2	44.6	44.6	8.6
Spain	4.9	56.7	17.5	21.0
Switzerland	9.9	34.3	19.1	36.6
United Kingdom	2.5	22.1	43.4	32.0
United States	8.3	11.6	35.5	44.6
Brazil	44.2	21.1	15.9	18.9
Singapore	2.7	96.4	0.0	0.9

Source: OECD Global Pension Statistics, August 2006

In constructing the efficient frontiers, a constraint was added that a minimum of 50% of the investment was required to be in bonds and cash to reflect the typical composition of a pension fund. An efficient frontier was plotted for this portfolio to show the returns at the given level of risk. Then an efficient frontier was plotted to reflect the addition of infrastructure to this restricted portfolio.

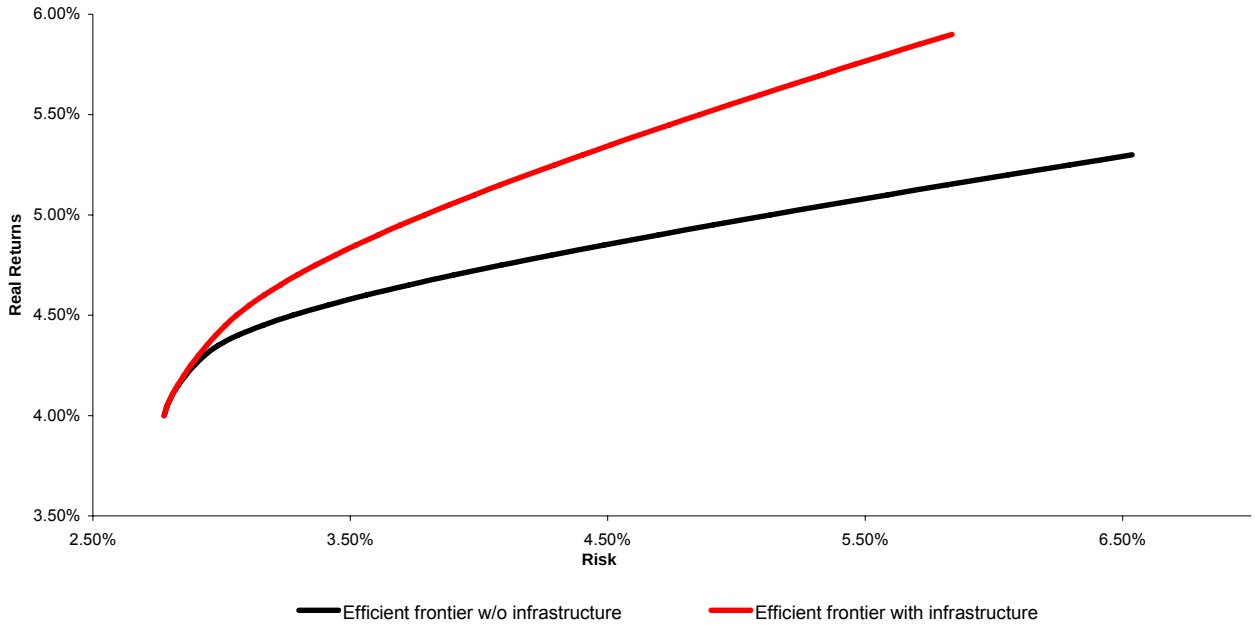
Figures 51 and 52 illustrate the risk, as measured by standard deviation, for a pension fund portfolio (with restricted investment) at various levels of returns. The details of the returns at corresponding levels of risk are given in the Appendix.

Fig 51 Risk-return levels for a pension fund portfolio

Portfolio for pension funds		
Real return	**Std dev with infrastructure**	**Std dev without infrastructure**
4.00%	2.78%	2.78%
4.20%	2.85%	2.86%
4.40%	2.98%	3.06%
4.60%	3.16%	3.56%
4.80%	3.44%	4.28%
5.00%	3.79%	5.13%
5.20%	4.19%	6.06%

Source: Evalueserve Analysis, April 2007

Fig 52 Diversified portfolio for pension funds (13 years)



Source: Evalueserve Analysis, April 2007

Addition of infrastructure to a pension fund's portfolio resulted in higher returns at the same risk level

The addition of infrastructure to restricted portfolios of pension funds shifted their efficient frontier to the left, showing that higher returns were achieved at the same risk level. This suggests that the inclusion of infrastructure in a portfolio is beneficial for the restricted portfolios of pension funds as well.

Appendix 1

Fig 53 Risk and real returns for a diversified portfolio (cash, bond, equities, emerging markets)

Points of efficient frontier without infrastructure					
Returns	**Risk**	**Returns**	**Risk**	**Returns**	**Risk**
4.00%	2.78%	5.30%	6.54%	6.60%	13.22%
4.05%	2.79%	5.35%	6.78%		
4.10%	2.81%	5.40%	7.03%		
4.15%	2.83%	5.45%	7.27%		
4.20%	2.86%	5.50%	7.52%		
4.25%	2.89%	5.55%	7.77%		
4.30%	2.93%	5.60%	8.03%		
4.35%	2.99%	5.65%	8.28%		
4.40%	3.06%	5.70%	8.53%		
4.45%	3.16%	5.75%	8.79%		
4.50%	3.28%	5.80%	9.04%		
4.55%	3.41%	5.85%	9.30%		
4.60%	3.56%	5.90%	9.56%		
4.65%	3.72%	5.95%	9.82%		
4.70%	3.90%	6.00%	10.08%		
4.75%	4.09%	6.05%	10.34%		
4.80%	4.28%	6.10%	10.60%		
4.85%	4.48%	6.15%	10.86%		
4.90%	4.69%	6.20%	11.12%		
4.95%	4.91%	6.25%	11.38%		
5.00%	5.13%	6.30%	11.64%		
5.05%	5.36%	6.35%	11.91%		
5.10%	5.59%	6.40%	12.17%		
5.15%	5.82%	6.45%	12.43%		
5.20%	6.06%	6.50%	12.70%		
5.25%	6.30%	6.55%	12.96%		

Source: Evalueserve Analysis, April 2007

Fig 54 Risk and real returns for a diversified portfolio including infrastructure

Points of efficient frontier without infrastructure					
Returns	**Risk**	**Returns**	**Risk**	**Returns**	**Risk**
4.00%	2.78%	5.30%	4.40%	6.60%	7.67%
4.05%	2.79%	5.35%	4.51%	6.65%	7.81%
4.10%	2.81%	5.40%	4.63%	6.70%	7.94%
4.15%	2.83%	5.45%	4.74%	6.75%	8.08%
4.20%	2.85%	5.50%	4.86%	6.80%	8.21%
4.25%	2.88%	5.55%	4.97%	6.85%	8.35%
4.30%	2.91%	5.60%	5.09%	6.90%	8.49%
4.35%	2.94%	5.65%	5.21%	6.95%	8.62%
4.40%	2.98%	5.70%	5.34%	7.00%	8.76%
4.45%	3.01%	5.75%	5.46%	7.05%	8.90%
4.50%	3.06%	5.80%	5.58%	7.10%	9.04%
4.55%	3.11%	5.85%	5.71%	7.15%	9.17%
4.60%	3.16%	5.90%	5.83%	7.20%	9.31%
4.65%	3.23%	5.95%	5.96%	7.25%	9.45%
4.70%	3.29%	6.00%	6.09%	7.30%	9.59%
4.75%	3.37%	6.05%	6.22%	7.35%	9.73%
4.80%	3.44%	6.10%	6.35%	7.40%	9.87%
4.85%	3.52%	6.15%	6.48%	7.45%	10.01%
4.90%	3.61%	6.20%	6.61%	7.50%	10.15%
4.95%	3.70%	6.25%	6.74%	7.55%	10.29%
5.00%	3.79%	6.30%	6.87%	7.60%	10.43%
5.05%	3.88%	6.35%	7.00%	7.65%	10.57%
5.10%	3.98%	6.40%	7.14%	7.70%	10.71%
5.15%	4.08%	6.45%	7.27%	7.75%	10.85%
5.20%	4.19%	6.50%	7.40%	7.80%	10.99%
5.25%	4.29%	6.55%	7.54%		

Source: Evalueserve Analysis, April 2007

Fig 55 Risk and real returns for a pension funds portfolio

Points of efficient frontier without infrastructure			
Returns	**Risk**	**Returns**	**Risk**
4.00%	2.78%	5.00%	5.13%
4.05%	2.79%	5.05%	5.36%
4.10%	2.81%	5.10%	5.59%
4.15%	2.83%	5.15%	5.82%
4.20%	2.86%	5.20%	6.06%
4.25%	2.89%	5.25%	6.30%
4.30%	2.93%	5.30%	6.54%
4.35%	2.99%		
4.40%	3.06%		
4.45%	3.16%		
4.50%	3.28%		
4.55%	3.41%		
4.60%	3.56%		
4.65%	3.72%		
4.70%	3.90%		
4.75%	4.09%		
4.80%	4.28%		
4.85%	4.48%		
4.90%	4.69%		
4.95%	4.91%		

Source: Evalueserve Analysis, April 2007

Fig 56 Risk and real returns for a pension funds portfolio including infrastructure

Points of efficient frontier without infrastructure			
Returns	**Risk**	**Returns**	**Risk**
4.00%	2.78%	5.00%	3.79%
4.05%	2.79%	5.05%	3.88%
4.10%	2.81%	5.10%	3.98%
4.15%	2.83%	5.15%	4.08%
4.20%	2.85%	5.20%	4.19%
4.25%	2.88%	5.25%	4.29%
4.30%	2.91%	5.30%	4.40%
4.35%	2.94%	5.35%	4.51%
4.40%	2.98%	5.40%	4.63%
4.45%	3.01%	5.45%	4.74%
4.50%	3.06%	5.50%	4.86%
4.55%	3.11%	5.55%	4.97%
4.60%	3.16%	5.60%	5.09%
4.65%	3.23%	5.65%	5.21%
4.70%	3.29%	5.70%	5.34%
4.75%	3.37%	5.75%	5.46%
4.80%	3.44%	5.80%	5.58%
4.85%	3.52%	5.85%	5.71%
4.90%	3.61%	5.90%	5.84%
4.95%	3.70%		

Source: Evalueserve Analysis, April 2007

Fig 57 13-year covariance (1994–2007)

	Equities	**Bonds**	**Cash**	**Emerging markets**	**Infrastructure**
Equities	0.15%				
Bonds	0.00%	0.01%			
Cash	0.01%	0.00%	0.04%		
Emerging markets	0.20%	-0.01%	0.01%	0.47%	
Infrastructure	0.07%	0.00%	0.02%	0.10%	0.10%

Source: Evalueserve Analysis, April 2007

This page is left blank intentionally

Appendix 2 –
Macquarie Global Infrastructure Index explained

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

CONTENTS

RESEARCHREPORT

ALTERNATIVE BENCHMARKS:
MACQUARIE GLOBAL INFRASTRUCTURE

FTSE THE INDEX COMPANY

Global Research
March 2007

FTSE RESEARCH

Andy Harvell
Head of Research
andy.harvell@ftse.com
+44 (0)20 7866 8986

FTSE PRODUCT MANAGEMENT

Lillian Goldthwaite
Business Unit Head – Equities
lillian.goldthwaite@ftse.com
+44 (0)20 7866 8062

Gareth Parker
Business Unit Head - Alternatives
gareth.parker@ftse.com
+44 (0)20 7866 1805

Mike Bruno
Business Unit Head – Fixed Income
mike.bruno@ftse.com
+ 1 212 641 6120

FTSE MARKETING & COMMUNICATIONS

Andrew Buckley
Director, Marketing & Communications
andrew.buckley@ftse.com
+44 (0)20 7866 8029

"The World's most comprehensive infrastructure index"

Executive Summary

Based on the FTSE Global Equity Index Series (GEIS) and calculated by FTSE Group, the Macquarie Global Infrastructure Index Series is designed to reflect the stock performance of companies engaged principally in the management, ownership and/or operation of infrastructure and utility assets.

These infrastructure and utility assets are basic services, facilities and/or institutions upon which the growth and development of a community depends. These assets include toll roads, airports, rail track, shipping ports, telecommunications infrastructure, schools, hospitals and utilities such as electricity, gas distribution networks and water.

The worldwide growth in both infrastructure, particularly from the growing trend for PPPs and the privatisation of government owned assets and utilities is proving to be one of the fastest growing asset classes, with secure income streams guaranteed for extended fixed-terms contract periods. Owing to the similarity of infrastructure assets to fixed interest securities in their relatively fixed income streams and fixed contract terms, often backed by a government guarantee, performance of the Macquarie Global Infrastructure indices has been compared to the FTSE Global Bonds Index. It can be shown that there is a negative correlation due partly to a higher yield than bonds and the hybrid nature of some infrastructure companies.

The Macquarie Global Infrastructure Indexes

The series consists of the top-level Macquarie Global Infrastructure Index and the Macquarie Global Infrastructure 100 Index. In addition there are six regional indexes, four sector indexes and four further sub-sector indexes.

Using the Indexes

The Indexes are designed to be used as a performance measure of infrastructure stocks, the basis for ETFs and index linked products and a range of tailored infrastructure investment products.

1.0 THE MACQUARIE GLOBAL INFRASTRUCTURE INDEX SERIES

1.1 The Indexes

1.1.1 Macquarie Global Infrastructure Index

The Macquarie Global Infrastructure Index (MGII) is based on stocks from the FTSE Global All Cap Index that have an infrastructure/utilities bias. The index has been developed to allow asset managers and investors to benchmark infrastructure performance on a global basis.

1.1.2 Macquarie Global Infrastructure 100 Index

The Macquarie Global Infrastructure 100 Index (MGII100) is a subset index of the Macquarie Global Infrastructure Index (MGII). Its purpose is to provide an investable sub-set of the broader index whilst capturing its underlying asset mix. This approach substantially reduces the complexity and cost of investing in the index across a variety of markets and currencies. Moreover, the MGII100 attempts to eliminate latent political risk of the developing regions where governments can influence the pricing regime of a concession.

The index represents approximately 85% - 90% of the MGII, with the smallest stock having an investable market capitalisation of USD2.5bn and has a high degree of correlation with the broader index, making it suitable for derivatives, ETFs and other index-linked financial products.

1.1.3 Macquarie USA Infrastructure Index

The Macquarie USA Infrastructure Index (MIUSA) calculated by FTSE is designed to reflect the stock performance of US companies within the infrastructure industry, principally those engaged in management, ownership and operation of infrastructure and utility assets. The infrastructure industry is now one of the world's fastest growing asset classes with a current market value of over USD1,700 billion.

The index is designed for the creation of derivatives, index tracking funds, ETFs and performance benchmarks.

1.2 Defining Infrastructure

In establishing the broad definition of infrastructure the focus has been on companies that actually manage the infrastructure compared to using the infrastructure. Macquarie has used a broad definition of infrastructure, namely all companies that are involved in providing the foundation of basic services, facilities and institutions upon which the growth and development of a community depends. There are, however, exclusions. These include rail operating companies as these derive their income from providing a service that uses the infrastructure rather than accessing the infrastructure. Likewise, trucking companies and airlines are excluded as they are principally users of the infrastructure and not the owners.

1.2.1 Economic Infrastructure

Key assets that are needed to support the long term growth of the economy. These assets typically have large up front capital costs with a long operating life and minimal on-going operating costs. The user pricing of the assets is either established at the beginning of the contract with the government or regulated by an external party. The user payments are typically small and/or the assets demonstrate monopolistic tendencies.

Examples of this type of economic infrastructure assets would include roads (Cintra, Abertis, Grupo Aeroportuario del Sureste SA de CV), airports (BAA) and ports (P&O, Associated British Ports).

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

1.2.2 Utilities

These assets have a strong "essential service" element for the community. They may also have a tentative relationship to the economic growth of the community. These sectors have a high degree of price regulation reflecting the essential nature of the businesses. This sector is well established and well recognised by the investment community. The common types of utilities are gas production and transmission networks, electricity generation and distribution, and water distribution and treatment. Examples of companies falling into this category would be Centrica, Powergen. E.On and Iberdrola.

1.2.3 Social Infrastructure

This sector has gained importance and grown as governments have embraced the concept of Public Private Partnership (PPP) to provide social infrastructure. This involves the private sector providing public sector facilities on long term contracts. This includes hospitals, schools, social housing, stadium, railway stations, prisons and other public buildings. Typically these assets are all medium dated and backed by long term government contracts. Unlike property assets the contract may have some form of volume leverage e.g. hospital waiting list targets to encourage efficiency. Ownership of the assets is normally only for the period of the concession instead of being freehold.

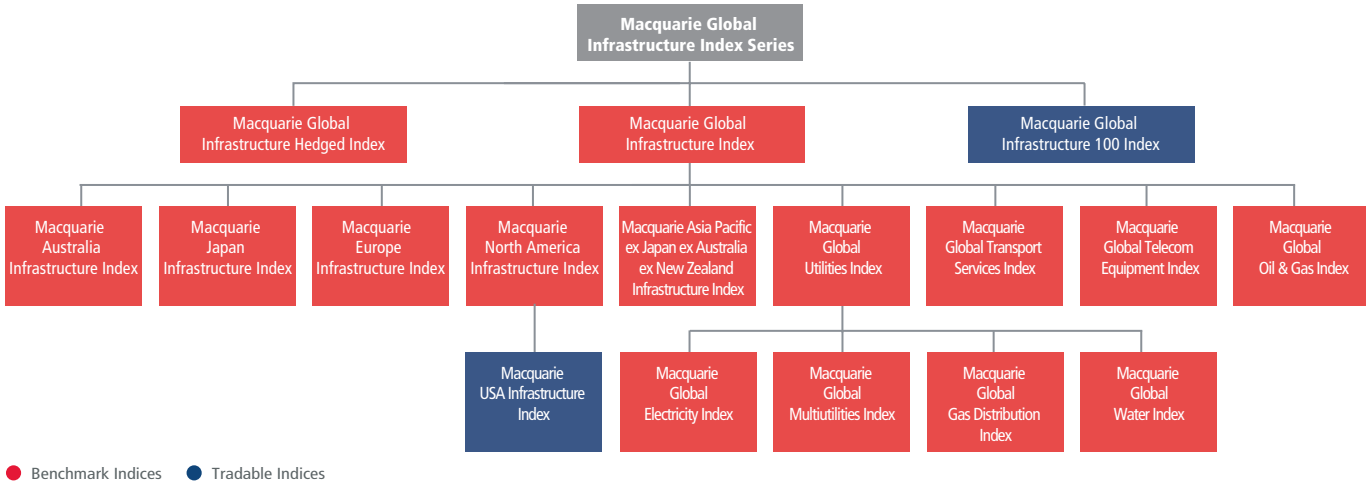
1.2.4 Commercial Infrastructure

Commercial infrastructure is an emerging sector. It is where economies gained from sharing infrastructure outweigh the competitive advantage achieved from owning and operating your own infrastructure. The telecommunications sector is an obvious example. Satellites, mobile phone masts, terrestrial transmission assets, cable networks, fibre optic networks, etc. all have this common element. However, unlike in economic or social infrastructure competition is typically stronger and as a result there is less government involvement and regulation.

Examples of companies in this sector include MCG, American Tower and Crown Castle Int'l Corp.

1.2.5 Mapping the Macquarie Infrastructure Definitions to the Industry Classification Benchmark (ICB)

FTSE have mapped the Macquarie infrastructure definitions across to match sectors within the Industry Classification Benchmark (ICB). The sectors mapped across include Oil & Gas Pipelines, Industrial Transportation, Utilities and Telecommunications Equipment. One company, is however, classified as a financial but is substantially involved in infrastructure finance.



1.3 Size, Country and Regional Representation

1.3.1 Breakdown of Macquarie Global Infrastructure Index into Large/Mid/Small Cap Components

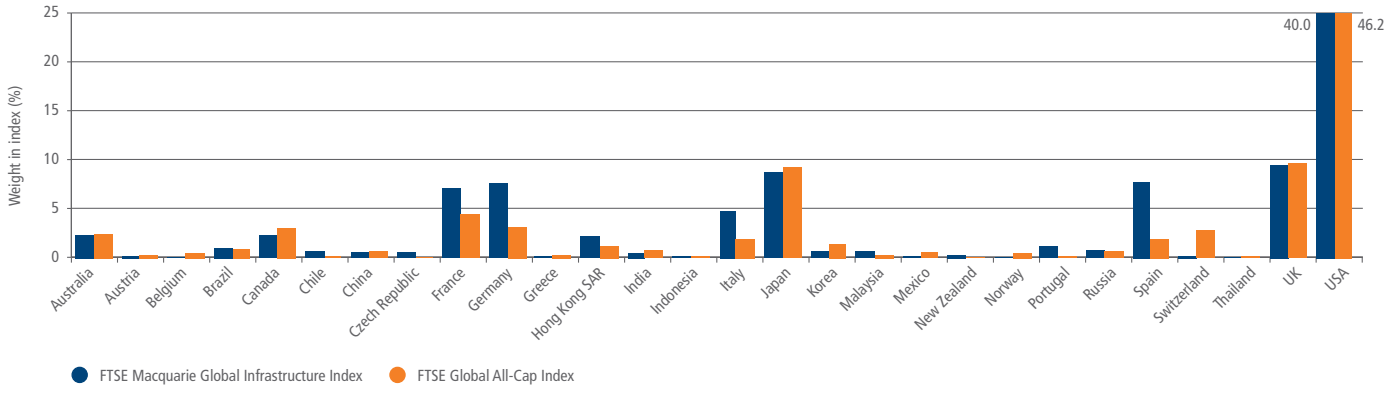
BREAKDOWN BY SIZE

Size segment	No. Cons	Gross Mkt Cap (USDm)	Net Mkt Cap (USDm)	Investable Wt (%)	Index Wt (%)
Large	87	1715.5	1279.1	74.6	75.8
Mid	66	320.2	249.8	78.0	14.8
Small	85	189.0	159.6	84.5	9.5
MGII Total	238	2224.7	1688.5	75.9	100.0

Source: FTSE Group, data as at 28 Feb, 2007

1.3.2 Country breakdown

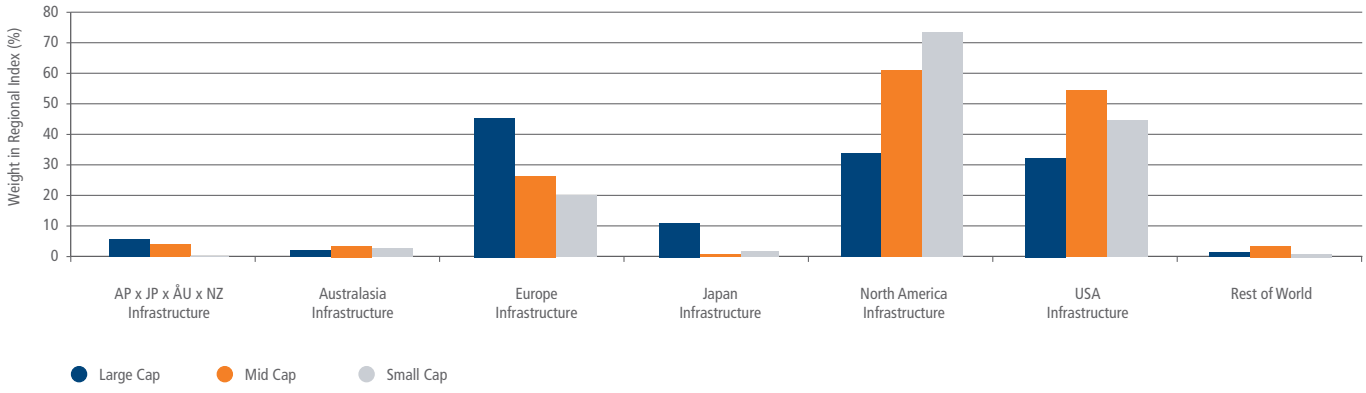
COUNTRY REPRESENTATION COMPARED TO FTSE ALL CAP INDEX



Source: FTSE Group, data as at 28 Feb, 2007

1.3.3 Size segmentation breakdown in regional and country indexes

COUNTRY REPRESENTATION COMPARED TO FTSE ALL CAP INDEX



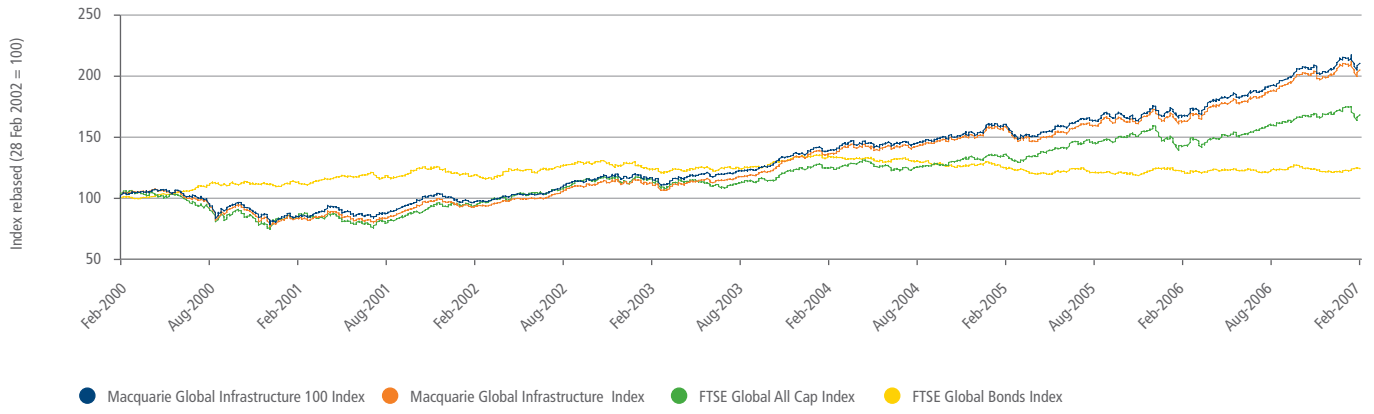
Source: FTSE Group, data as at 28 Feb, 2007

2.0 MACQUARIE GLOBAL INFRASTRUCTURE INDEXES

2.1 Performance charts

2.1.1 Price index performance over five years

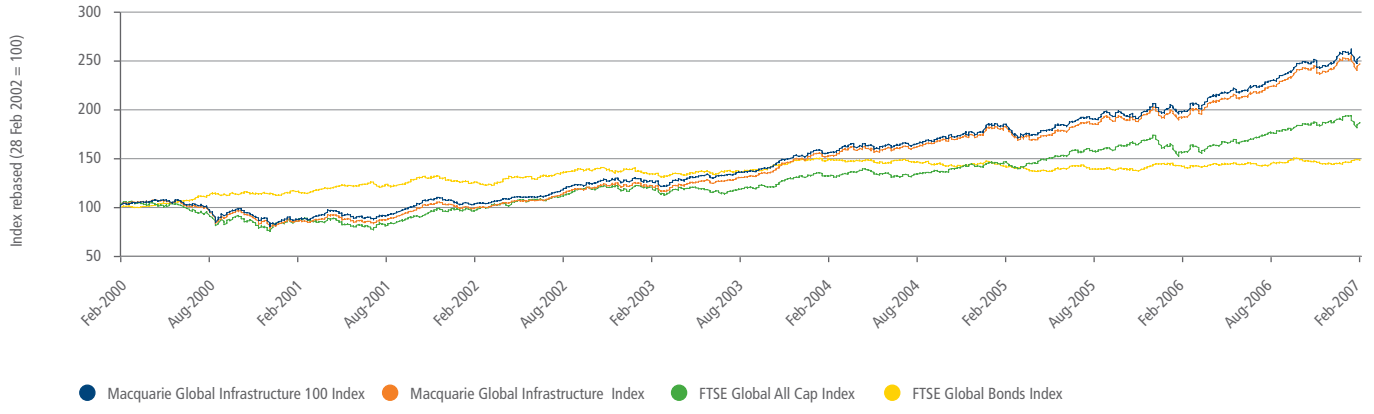
5-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

2.1.2 Price index performance over five years

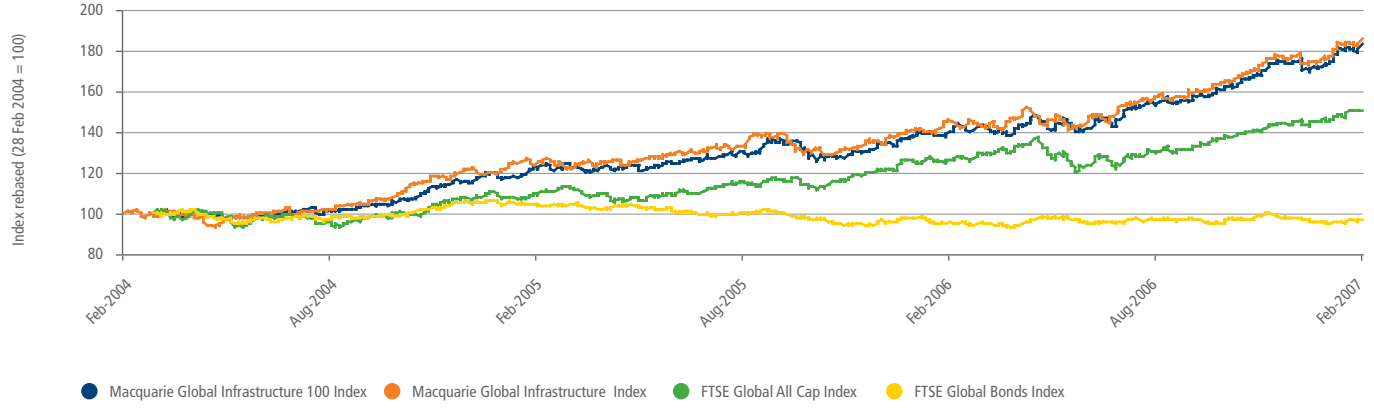
5-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 20077

2.1.3 Price index performance over three years

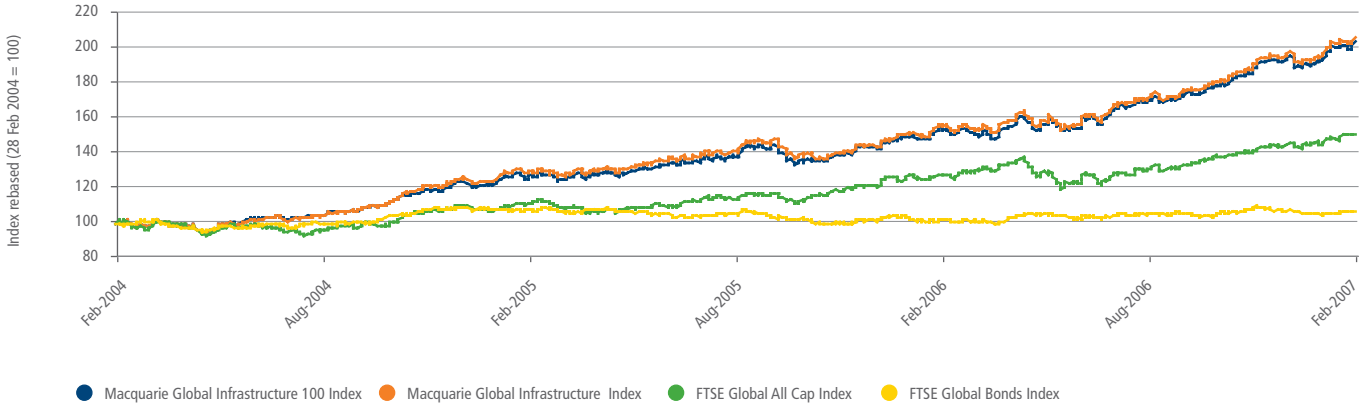
3-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

2.1.4 Total return index performance over three years

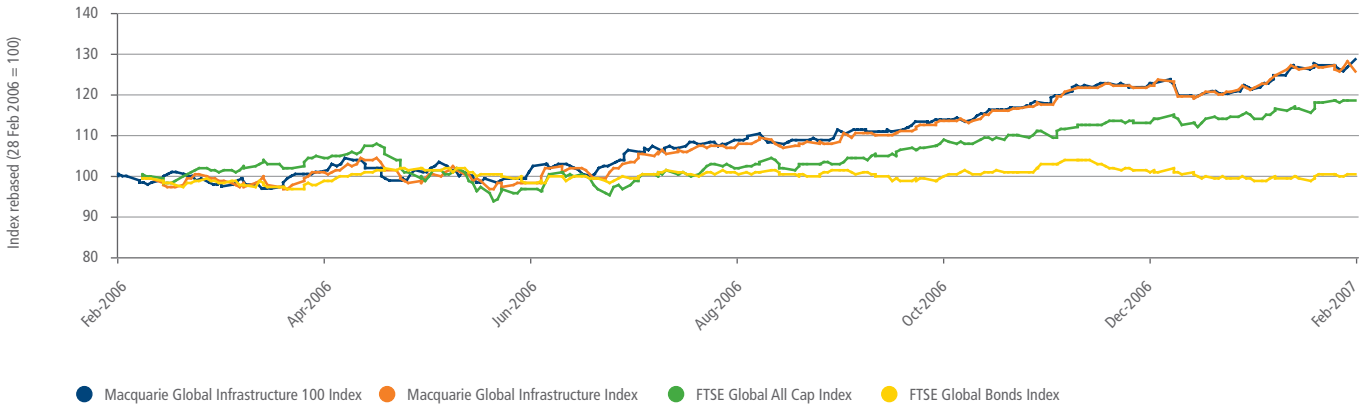
3-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

2.1.5 Price index performance over one year

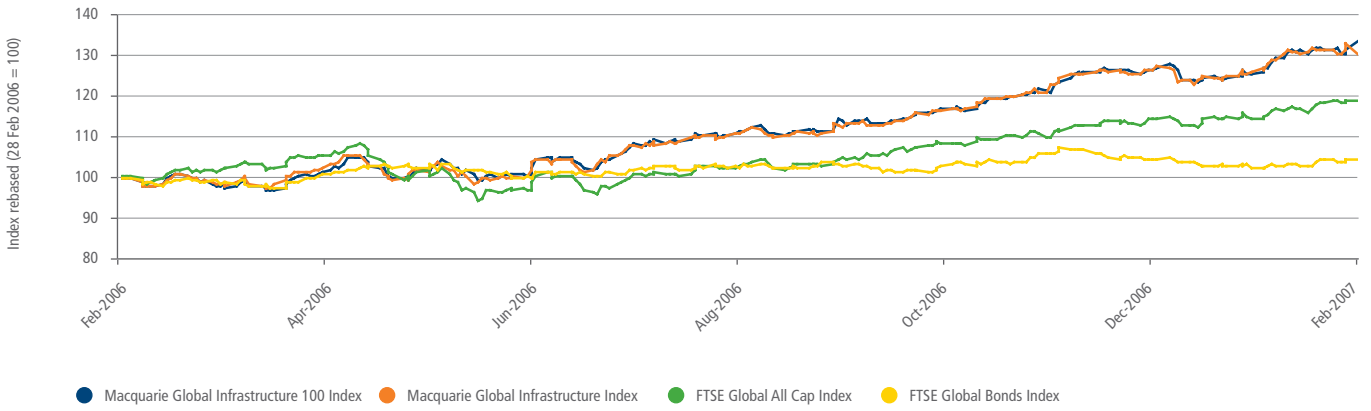
1-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 20077

2.1.6 Total return index performance over one year

1-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

2.2 Performance tables

2.2.1 Year-on-year performance over 5 years (USD)

RETURNS OVER THE LAST 5 CALENDAR YEARS

Index	2006		2005		2004		2003		2002	
	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)
Macquarie Global Infrastructure 100 Index	32.0	36.6	10.6	14.7	25.2	30.0	25.4	30.5	-12.3	-8.5
Macquarie Global Infrastructure Index	32.8	37.4	9.6	13.5	27.3	32.0	27.2	32.5	-18.1	-14.7
FTSE Global All Cap Index	19.9	22.4	9.5	12.0	14.7	17.0	33.3	36.2	-19.4	-17.9
FTSE Global Bonds Index	1.7	22.4	-10.2	12.0	5.8	17.0	10.0	36.2	14.8	-17.9

Source: FTSE Group, data as at 28 Feb, 2007

2.2.2 Year-on-year performance over 5 years (USD)

RETURNS OVER THE LAST 5 YEARS

Index	1Yr		2Yr		3Yr		4Yr		5Yr	
	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)
Macquarie Global Infrastructure 100	24.5	28.9	44.9	55.3	77.8	97.7	144.7	183.0	110.4	153.9
Macquarie Global Infrastructure	24.2	28.4	43.7	53.8	80.1	99.8	150.4	189.0	105.2	147.0
FTSE Global All Cap	14.7	17.1	30.4	36.1	45.6	55.1	112.0	130.7	69.0	87.5
FTSE Global Bonds	2.0	5.6	-6.6	-0.1	-2.7	7.7	4.4	19.8	24.3	48.4

Source: FTSE Group, data as at 28 Feb, 2007

2.3 Risk statistics

2.3.1 Volatility and Sharpe Ratios

PERFORMANCE, VOLATILITY AND SHARPE RATIOS OVER 5 YEARS

Headline Index	Measure	3M (%)	6M (%)	12M (%)	3YR (%)	5YR (%)	5YR Ann (%)
Macquarie Global Infrastructure 100	Price Index Return	4.2	14.0	24.5	77.8	110.4	16.0
	Volatility (Ann.)	10.28	8.91	10.30	7.85	11.63	
	Sharpe Ratio	1.18	2.43	1.66	2.04	1.07	
Macquarie Global Infrastructure	Price Index Return	3.9	14.0	24.2	80.1	105.2	15.5
	Volatility (Ann.)	10.93	21.73	16.82	16.42	11.96	
	Sharpe Ratio	1.57	1.92	1.70	1.96	0.96	
F TSE Global All Cap	Price Index Return	2.7	10.9	14.7	45.6	69.0	11.1
	Volatility (Ann.)	6.43	7.51	7.07	8.61	12.53	
	Sharpe Ratio	-1.85	-0.46	-0.41	1.09	0.65	
FTSE Global Bonds	Price Index Return	2.7	10.9	14.7	-2.7	24.3	4.4
	Volatility (Ann.)	7.37	12.51	8.35	6.13	6.96	
	Sharpe Ratio	0.81	1.28	1.40	-0.66	0.28	

Source: FTSE Group, data as at 28 Feb, 2007

2.4 Correlations

2.4.1 Correlations over 3m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Global Infrastructure 100	Macquarie Global Infrastructure	FTSE Global All Cap	FTSE Global Bonds
Macquarie Global Infrastructure 100	1.000			
Macquarie Global Infrastructure	0.997	1.000		
FTSE Global All Cap	0.099	0.082	1.000	
FTSE Global Bonds	0.799	0.832	0.060	1.000

Source: FTSE Group, data as at 28 Feb, 2007

2.4.2 Correlations over 6m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Global Infrastructure 100	Macquarie Global Infrastructure	FTSE Global All Cap	FTSE Global Bonds
Macquarie Global Infrastructure 100	1.000			
Macquarie Global Infrastructure	0.997	1.000		
FTSE Global All Cap	0.217	0.204	1.000	
FTSE Global Bonds	0.747	0.783	0.113	1.000

Source: FTSE Group, data as at 28 Feb, 2007

2.4.3 Correlations over 12m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Global Infrastructure 100	Macquarie Global Infrastructure	FTSE Global All Cap	FTSE Global Bonds
Macquarie Global Infrastructure 100	1.000			
Macquarie Global Infrastructure	0.994	1.000		
FTSE Global All Cap	0.370	0.361	1.000	
FTSE Global Bonds	0.811	0.849	0.266	1.000

Source: FTSE Group, data as at 28 Feb, 2007

2.4.4 Correlations over 3 years

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Global Infrastructure 100	Macquarie Global Infrastructure	FTSE Global All Cap	FTSE Global Bonds
Macquarie Global Infrastructure 100	1.000			
Macquarie Global Infrastructure	0.981	1.000		
FTSE Global All Cap	0.633	0.671	1.000	
FTSE Global Bonds	0.649	0.642	0.274	1.000

Source: FTSE Group, data as at 28 Feb, 2007

2.4.5 Correlations over 5 years

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Global Infrastructure 100	Macquarie Global Infrastructure	FTSE Global All Cap	FTSE Global Bonds
Macquarie Global Infrastructure 100	1.000			
Macquarie Global Infrastructure	0.987	1.000		
FTSE Global All Cap	0.683	0.736	1.000	
FTSE Global Bonds	0.360	0.315	-0.068	1.000

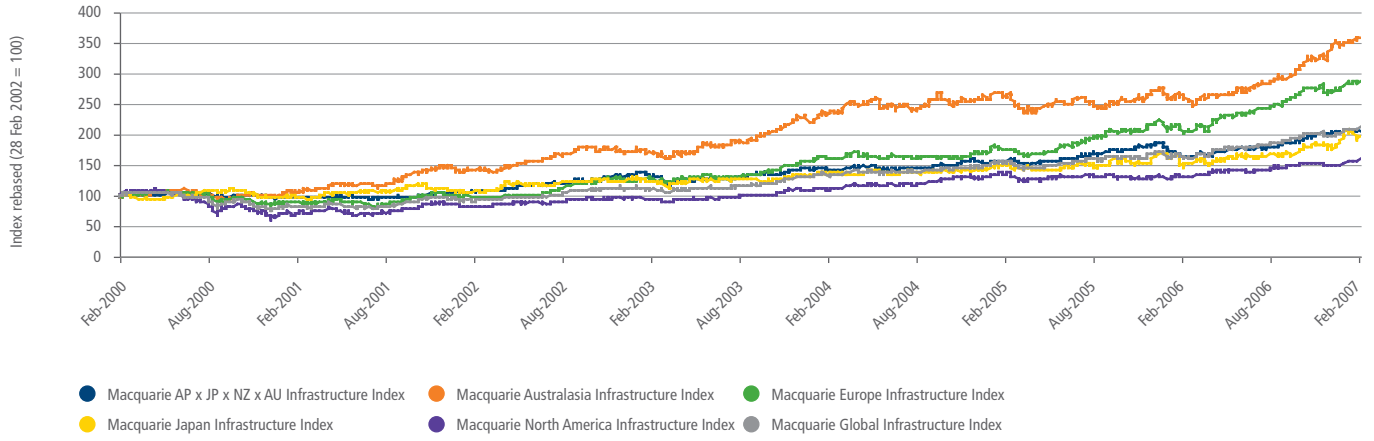
Source: FTSE Group, data as at 28 Feb, 2007

3.0 MACQUARIE GLOBAL INFRASTRUCTURE INDEX SERIES – REGIONAL INDEXES

3.1 Performance charts

3.1.1 Price index performance over five years

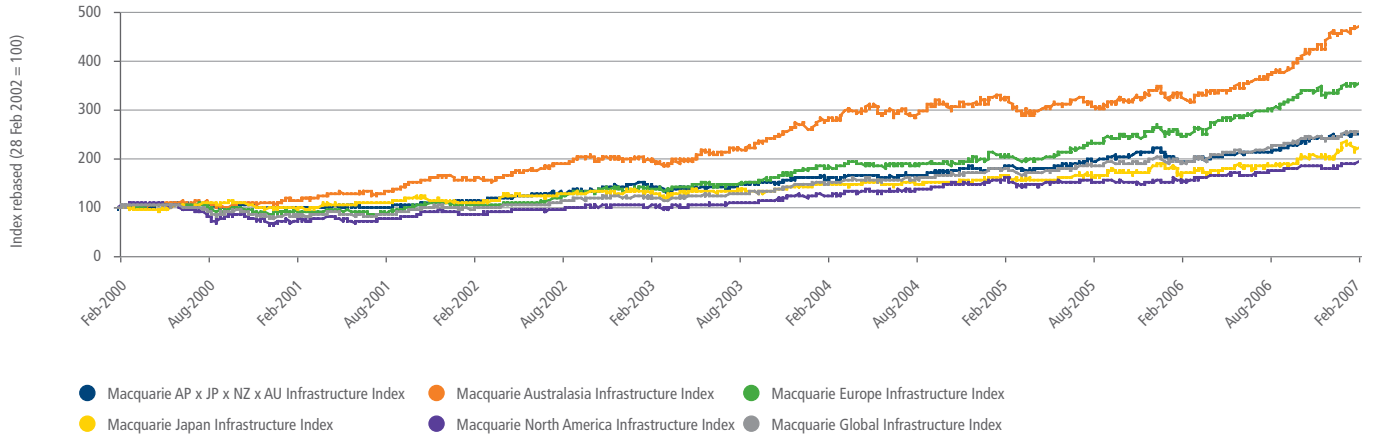
5-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

3.1.2 Total return index performance over five years

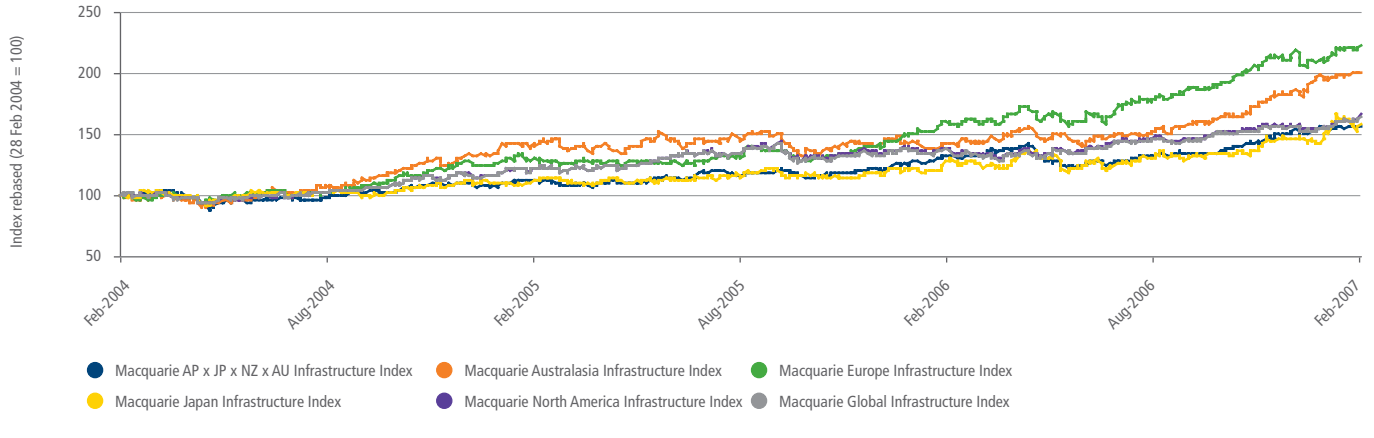
5-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 20077

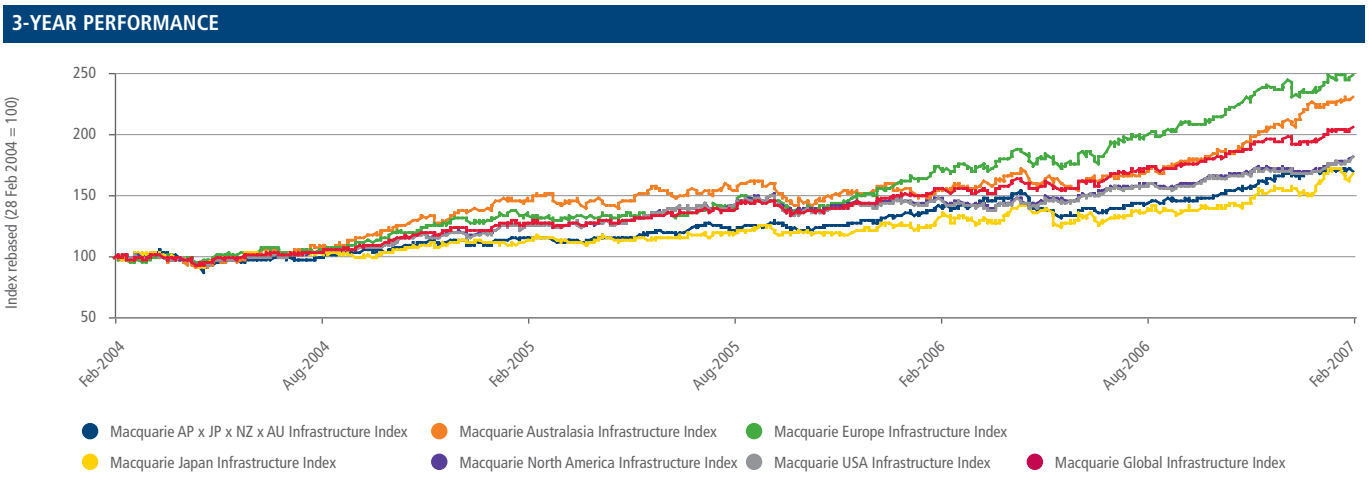
3.1.3 Price index performance over three years

3-YEAR PERFORMANCE



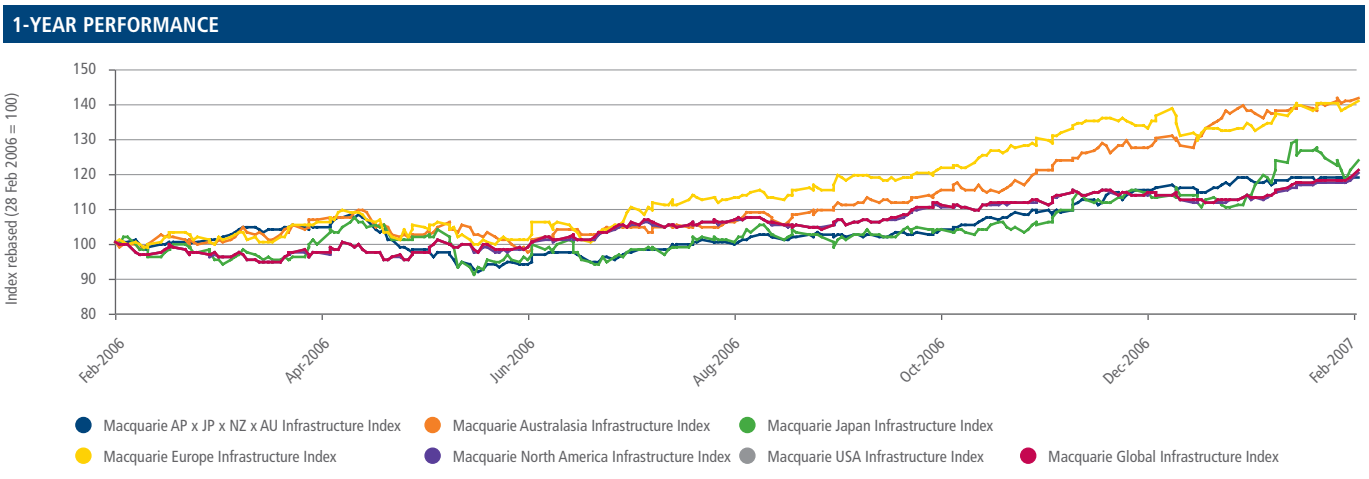
Source: FTSE Group, data as at 28 Feb, 2007

3.1.4 Total return index performance over three years



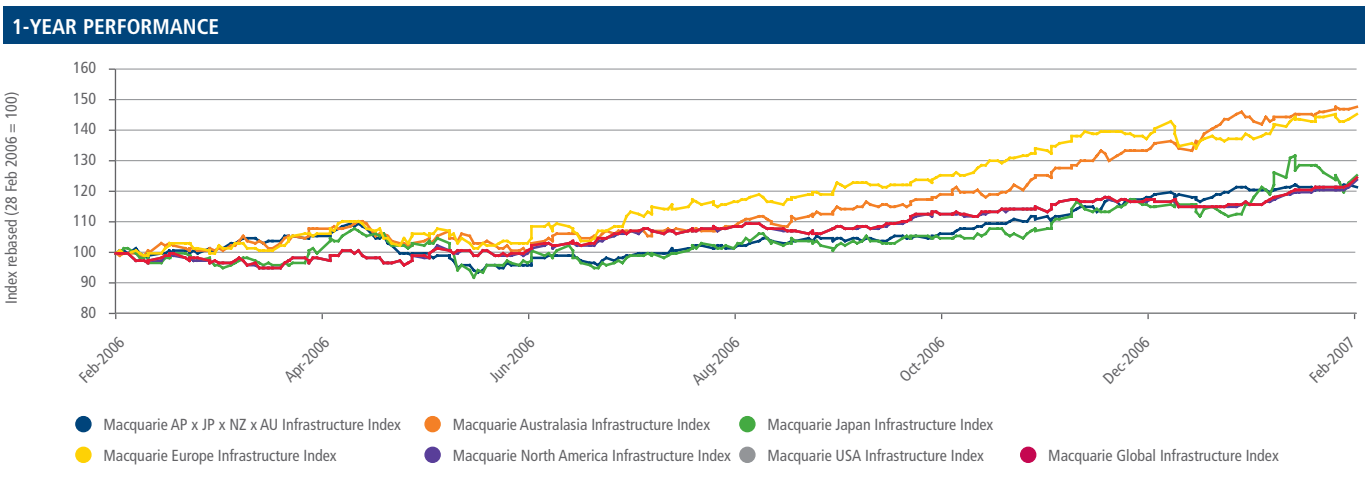
Source: FTSE Group, data as at 28 Feb, 2007

3.1.5 Price index performance over one year



Source: FTSE Group, data as at 28 Feb, 20077

3.1.6 Total return index performance over one year



Source: FTSE Group, data as at 28 Feb, 2007

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

3.2 Performance tables

3.2.1 Year-on-year performance over 5 years (USD)

RETURNS OVER THE LAST 5 CALENDAR YEARS

Regional Index	2006		2005		2004		2003		2002	
	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)
Macquarie Global Infrastructure	26.3	30.2	9.8	13.7	16.3	20.1	28.0	32.9	2.3	6.7
Macquarie AP x JPN x NZ x AU Infrastructure	29.9	36.6	6.2	11.4	35.9	41.3	53.4	59.1	17.5	28.3
Macquarie Australasia Infrastructure	54.6	60.8	8.9	13.1	36.6	42.2	32.6	38.8	-11.8	-8.2
Macquarie Europe Infrastructure	24.7	26.9	4.7	6.9	13.5	15.7	16.2	19.2	-0.6	2.1
Macquarie Japan Infrastructure	17.3	21.0	14.1	18.1	20.1	24.7	23.4	28.6	-28.1	-24.9
Macquarie North America Infrastructure	32.8	37.4	11.1	15.1	25.6	30.2	27.2	32.5	-18.1	-14.7
Macquarie USA Infrastructure	17.7	21.4	13.1	16.9	20.4	24.9	n/a	n/a	n/a	n/a

Source: FTSE Group, data as at 28 Feb, 2007

3.2.2 Year-on-year performance over 5 years (USD)

RETURNS OVER THE LAST 5 YEARS

Regional Index	1Yr		2Yr		3Yr		4Yr		5Yr	
	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)
Macquarie Global Infrastructure	14.2	17.2	33.2	41.5	49.7	65.1	103.4	132.8	99.3	138.4
Macquarie AP x JPN x NZ x AU Infrastructure	36.5	43.7	37.1	51.0	94.8	123.1	184.7	238.1	245.6	349.7
Macquarie Australasia Infrastructure	34.0	39.3	63.4	76.3	111.9	138.0	214.1	269.0	173.9	235.1
Macquarie Europe Infrastructure	23.0	25.2	41.0	46.6	58.3	67.8	85.5	101.7	98.5	121.8
Macquarie Japan Infrastructure	16.5	20.3	32.6	41.5	60.4	77.4	119.0	152.3	56.3	88.5
Macquarie North America Infrastructure	24.2	28.4	45.8	56.0	80.1	99.8	150.4	189.0	105.2	147.0
Macquarie USA Infrastructure	17.4	21.2	32.4	41.3	60.1	77.1	n/a	n/a	n/a	n/a

Source: FTSE Group, data as at 28 Feb, 2007

3.3 Risk statistics

3.3.1 Volatility and Sharpe Ratios

PERFORMANCE, VOLATILITY AND SHARPE RATIOS OVER 5 YEARS

Regional Index	Measure	3M (%)	6M (%)	12M (%)	3YR (%)	5YR (%)	5YR Ann (%)
Macquarie Global Infrastructure	Price Index Return	4.2	13.4	14.2	62.1	109.8	16.0
	Volatility (Ann.)	9.88	8.56	10.04	8.13	12.33	
	Sharpe Ratio	1.11	2.54	1.68	0.19	0.17	
Macquarie AP x JP x NZ x AU Infrastructure	Price Index Return	10.9	26.0	36.5	62.1	109.8	16.0
	Volatility (Ann.)	11.61	10.04	11.38	10.97	9.55	
	Sharpe Ratio	1.03	2.05	0.74	-0.23	0.32	
Macquarie Australasia Infrastructure	Price Index Return	2.6	18.1	34.0	98.5	247.7	28.3
	Volatility (Ann.)	13.94	12.56	14.43	12.76	13.19	
	Sharpe Ratio	2.71	3.34	1.82	0.33	1.00	
Macquarie Europe Infrastructure	Price Index Return	13.1	18.8	23.0	126.6	171.0	22.1
	Volatility (Ann.)	14.41	12.67	15.26	10.16	14.56	
	Sharpe Ratio	0.39	2.28	1.60	0.85	0.56	
Macquarie Japan Infrastructure	Price Index Return	2.9	8.6	16.5	47.8	91.6	13.9
	Volatility (Ann.)	25.46	20.79	21.28	11.39	12.99	
	Sharpe Ratio	1.81	1.44	0.74	-0.49	0.10	
Macquarie North America Infrastructure	Price Index Return	3.9	14.0	24.2	58.0	49.1	8.3
	Volatility (Ann.)	9.71	8.55	10.34	8.81	14.80	
	Sharpe Ratio	0.72	1.37	1.01	-0.38	-0.25	
Macquarie USA Infrastructure	Price Index Return	3.7	9.3	17.4	57.3	n/a	n/a
	Volatility (Ann.)	10.00	8.84	10.69	8.72	n/a	
	Sharpe Ratio	0.99	1.48	1.05	-0.40	n/a	

Source: FTSE Group, data as at 28 Feb, 2007

3.4 Correlations

3.4.1 Correlations over 3m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Australasia Infrastructure	Macquarie AP x JPN xNZ x AU Infrastructure	Macquarie Japan Infrastructure	Macquarie Europe Infrastructure	Macquarie North America Infrastructure	Macquarie USA Infrastructure	Macquarie Global Infrastructure
Macquarie Australasia Infrastructure	1.000						
Macquarie AP x JPN x NZ x AU Infrastructure	0.324	1.000					
Macquarie Japan Infrastructure	0.280	0.376	1.000				
Macquarie Europe Infrastructure	0.131	0.128	0.235	1.000			
Macquarie North America Infrastructure	0.028	0.131	0.570	0.012	1.000		
Macquarie USA Infrastructure	0.014	0.116	0.551	0.011	0.998	1.000	
Macquarie Global Infrastructure	0.287	0.366	0.930	0.371	0.774	0.759	1.000

Source: FTSE Group, data as at 28 Feb, 2007

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

3.4.2 Correlations over 6m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Australasia Infrastructure	Macquarie AP x JPN xNZ x AU Infrastructure	Macquarie Japan Infrastructure	Macquarie Europe Infrastructure	Macquarie North America Infrastructure	Macquarie USA Infrastructure	Macquarie Global Infrastructure
Macquarie Australasia Infrastructure	1.000						
Macquarie AP x JPN x NZ x AU Infrastructure	0.375	1.000					
Macquarie Japan Infrastructure	0.265	0.368	1.000				
Macquarie Europe Infrastructure	0.246	0.241	0.254	1.000			
Macquarie North America Infrastructure	0.037	0.173	0.500	0.086	1.000		
Macquarie USA Infrastructure	0.024	0.167	0.485	0.082	0.996	1.000	
Macquarie Global Infrastructure	0.305	0.409	0.908	0.415	0.761	0.748	1.000

Source: FTSE Group, data as at 28 Feb, 2007

3.4.3 Correlations over 12m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Australasia Infrastructure	Macquarie AP x JPN xNZ x AU Infrastructure	Macquarie Japan Infrastructure	Macquarie Europe Infrastructure	Macquarie North America Infrastructure	Macquarie USA Infrastructure	Macquarie Global Infrastructure
Macquarie Australasia Infrastructure	1.000						
Macquarie AP x JPN x NZ x AU Infrastructure	0.449	1.000					
Macquarie Japan Infrastructure	0.307	0.349	1.000				
Macquarie Europe Infrastructure	0.366	0.333	0.331	1.000			
Macquarie North America Infrastructure	0.036	0.110	0.398	0.116	1.000		
Macquarie USA Infrastructure	0.026	0.097	0.379	0.108	0.996	1.000	
Macquarie Global Infrastructure	0.356	0.395	0.894	0.469	0.720	0.703	1.000

Source: FTSE Group, data as at 28 Feb, 2007

3.4.4 Correlations over 3 years

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Australasia Infrastructure	Macquarie AP x JPN xNZ x AU Infrastructure	Macquarie Japan Infrastructure	Macquarie Europe Infrastructure	Macquarie North America Infrastructure	Macquarie USA Infrastructure	Macquarie Global Infrastructure
Macquarie Australasia Infrastructure	1.000						
Macquarie AP x JPN x NZ x AU Infrastructure	0.656	1.000					
Macquarie Japan Infrastructure	0.659	0.599	1.000				
Macquarie Europe Infrastructure	0.343	0.357	0.366	1.000			
Macquarie North America Infrastructure	0.467	0.635	0.475	0.564	1.000		
Macquarie USA Infrastructure	0.462	0.633	0.471	0.558	0.996	1.000	
Macquarie Global Infrastructure	0.717	0.748	0.847	0.625	0.851	0.846	1.000

Source: FTSE Group, data as at 28 Feb, 2007

3.4.5 Correlations over 5 years

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Macquarie Australasia Infrastructure	Macquarie AP x JPN xNZ x AU Infrastructure	Macquarie Japan Infrastructure	Macquarie Europe Infrastructure	Macquarie North America Infrastructure	Macquarie USA Infrastructure	Macquarie Global Infrastructure
Macquarie Australasia Infrastructure	1.000						
Macquarie AP x JPN x NZ x AU Infrastructure	0.573	1.000					
Macquarie Japan Infrastructure	0.495	0.608	1.000				
Macquarie Europe Infrastructure	0.221	0.302	0.344	1.000			
Macquarie North America Infrastructure	0.399	0.570	0.699	0.300	1.000		
Macquarie USA Infrastructure	n/a	n/a	n/a	n/a	n/a	1.000	
Macquarie Global Infrastructure	0.528	0.663	0.908	0.442	0.921	n/a	1.000

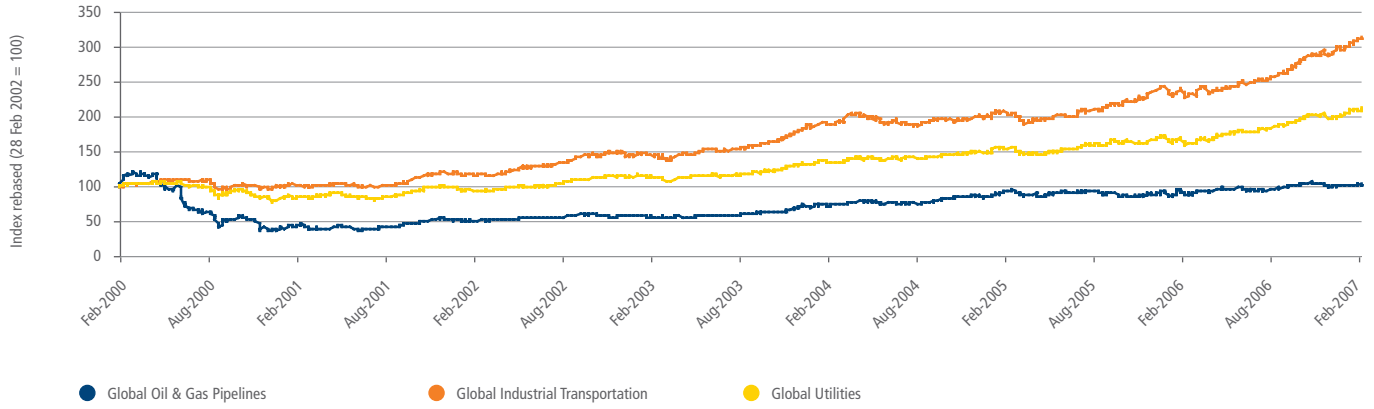
Source: FTSE Group, data as at 28 Feb, 2007

4.0 MACQUARIE GLOBAL INFRASTRUCTURE INDEX SERIES - SECTOR INDEXES

4.1 Performance charts

4.1.1 Price index performance over five years

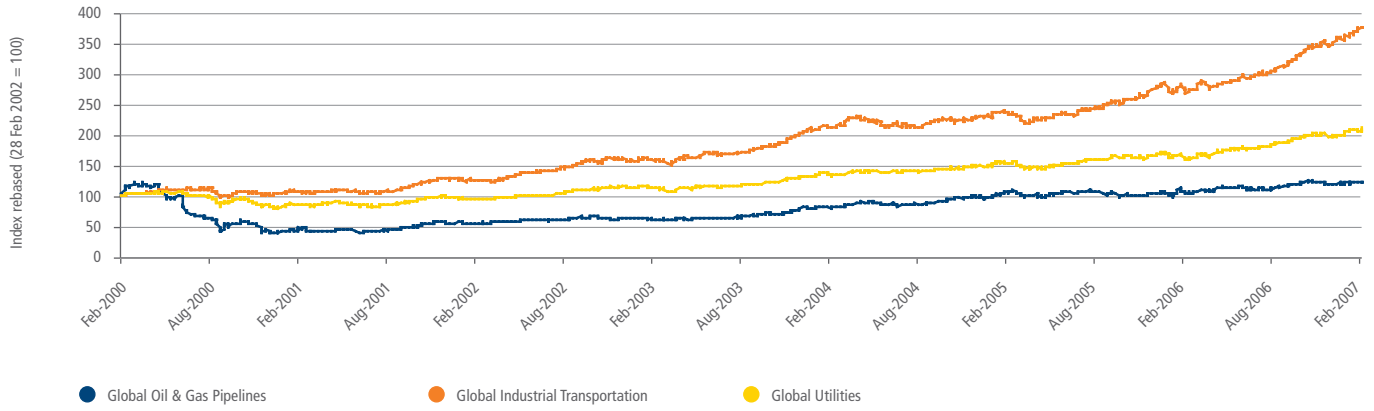
5-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

4.1.2 Price index performance over five years

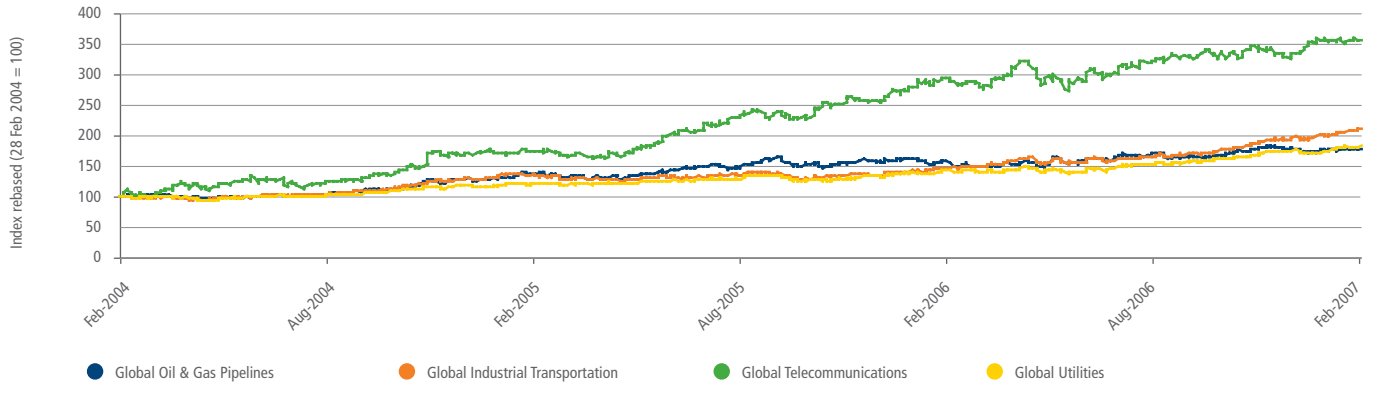
5-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 20077

4.1.3 Price index performance over three years

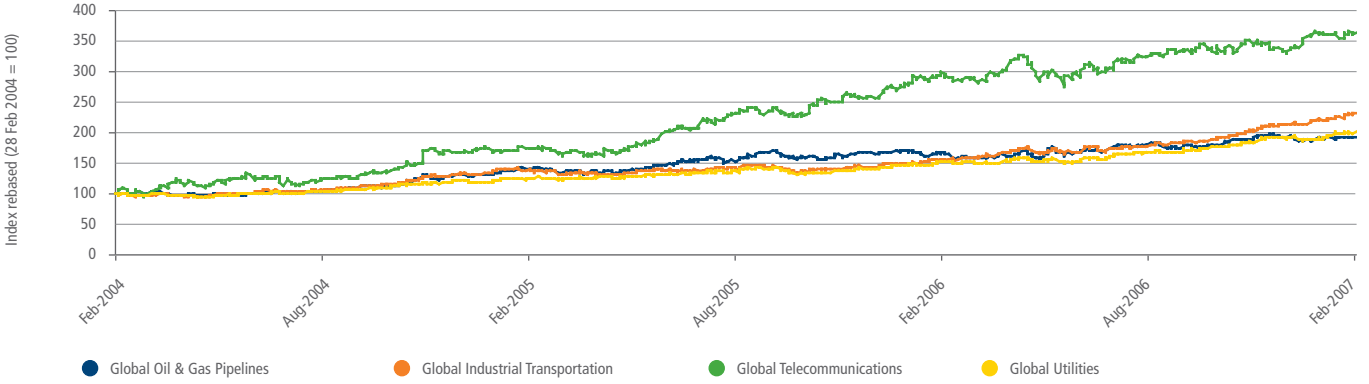
3-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

4.1.4 Price index performance over three years

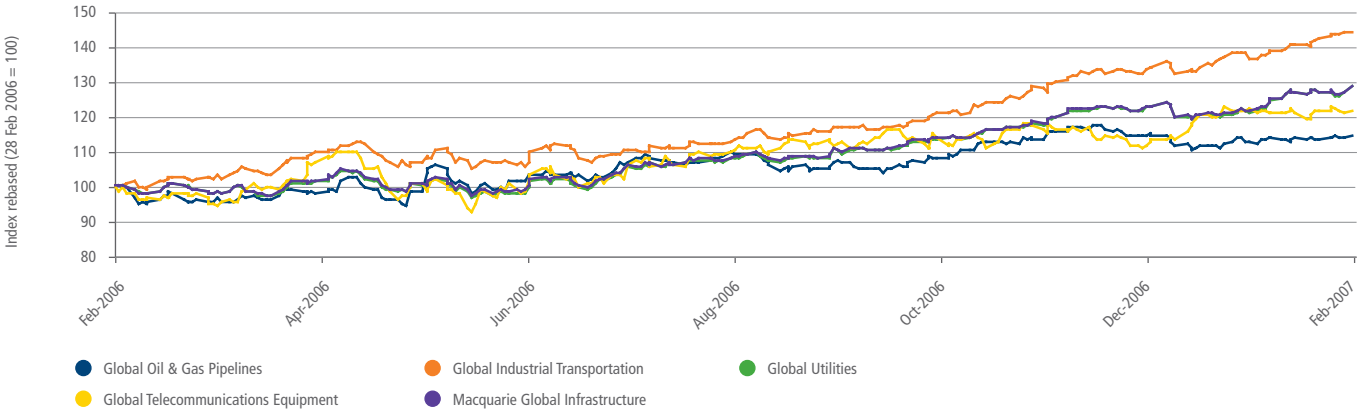
3-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

4.1.5 Price index performance over one year

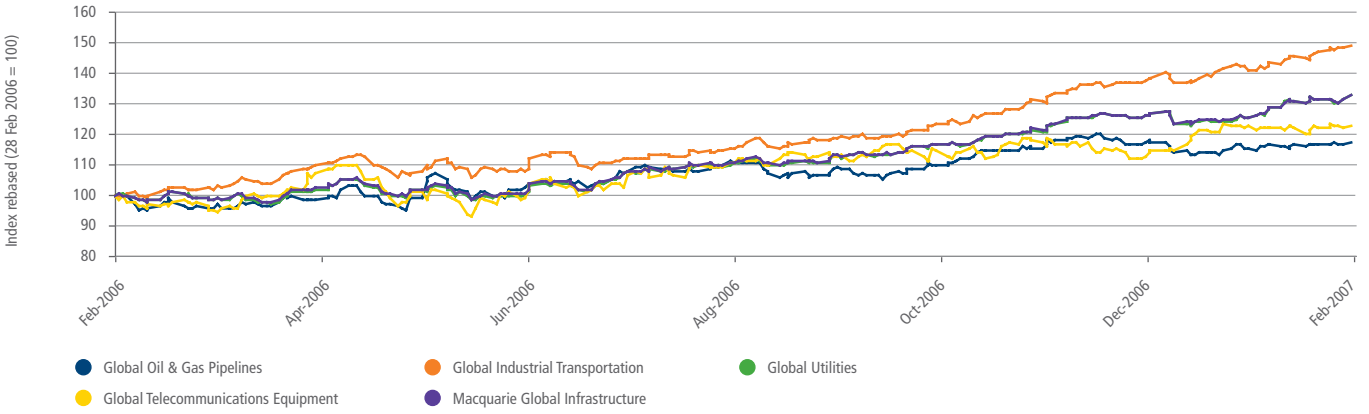
1-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

4.1.6 Price index performance over one year

1-YEAR PERFORMANCE



Source: FTSE Group, data as at 28 Feb, 2007

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

4.2 Performance tables

4.2.1 Year-on-year performance over 5 years (USD)

RETURNS OVER THE LAST 5 YEARS

Sector Index	2006		2005		2004		2003		2002	
	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)
Global Oil & Gas Pipelines	14.1	17.0	21.1	24.8	25.5	29.7	50.5	55.7	-66.4	-64.8
Global Transportation	46.0	50.9	3.4	7.3	36.9	41.5	37.2	42.2	6.6	12.1
Global Utilities	33.1	37.8	10.7	14.7	24.3	29.0	25.1	30.4	-15.3	-11.8
Global Telecommunications Equipment	30.1	31.2	50.0	51.4	82.4	82.9	188.3	189.5	-	-
Macquarie Global Infrastructure Index	32.8	37.4	9.6	13.5	27.3	32.0	27.2	32.5	-18.1	-14.7

Source: FTSE Group, data as at 28 Feb, 2007

4.2.2 Performance years to date (USD)

RETURNS OVER THE LAST 5 YEARS

Regional Index	1Yr		2Yr		3Yr		4Yr		5Yr	
	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)	PI (%)	TR (%)
Global Oil & Gas Pipelines	10.7	13.5	26.1	33.0	73.1	88.7	148.8	180.3	0.4	18.9
Global Transportation	39.5	44.3	50.4	61.3	104.3	126.5	200.6	245.3	202.5	265.6
Global Utilities	24.1	28.5	46.1	56.6	77.5	97.4	144.7	183.4	105.1	147.6
Global Telecommunications Equipment	15.7	16.5	96.3	99.4	241.4	248.3	798.4	820.1	-	-
Macquarie Global Infrastructure Index	24.2	28.4	43.7	53.8	80.1	99.8	150.4	189.0	105.2	147.0

Source: FTSE Group, data as at 28 Feb, 2007

4.3 Risk statistics

4.3.1 Volatility and Sharpe Ratios

PERFORMANCE, VOLATILITY AND SHARPE RATIOS OVER 5 YEARS

Regional Index	Measure	3M (%)	6M (%)	12M (%)	3YR (%)	5YR (%)	5YR Ann (%)
Global Oil & Gas Pipelines	Price Index Return	-3.9	1.8	10.7	75.2	2.5	0.5
	Volatility (Ann.)	10.07	10.62	14.52	13.74	28.87	
	Sharpe Ratio	-2.14	-0.11	0.37	1.14	-0.06	
Global Transportation	Price Index Return	8.0	22.4	39.5	107.9	203.3	24.8
	Volatility (Ann.)	9.50	9.11	11.26	10.74	11.72	
	Sharpe Ratio	2.83	3.97	2.53	1.99	1.69	
Global Utilities	Price Index Return	4.2	14.4	24.1	80.6	99.5	14.8
	Volatility (Ann.)	10.38	9.00	10.41	8.05	12.01	
	Sharpe Ratio	1.16	2.50	1.61	2.07	0.95	
Global Telecommunications Equipment	Price Index Return	-1.0	4.2	15.7	254.8	-	-
	Volatility (Ann.)	14.89	16.04	19.79	20.23	-	
	Sharpe Ratio	-0.62	0.22	0.49	1.93	-	
Macquarie Global Infrastructure	Price Index Return	7.3	1.4	9.1	83.3	100.5	14.9
	Volatility (Ann.)	4.94	4.91	4.83	3.07	2.36	
	Sharpe Ratio	10.93	21.73	16.82	17.12	11.55	

Source: FTSE Group, data as at 28 Feb, 2007

4.4 Correlations

4.4.1 Correlations over 3m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Global Oil & Gas Pipelines	Global Transportation	Utilities	Global Telecommunications Equipment	Macquarie Global Infrastructure
Global Oil & Gas Pipelines	1.000				
Global Transportation	0.456	1.000			
Global Utilities	0.516	0.617	1.000		
Global Telecommunications Equipment	0.349	0.323	0.354	1.000	
Macquarie Global Infrastructure	0.558	0.653	0.998	0.388	1.000

Source: FTSE Group, data as at 28 Feb, 2007

4.4.2 Correlations over 6m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Global Oil & Gas Pipelines	Global Transportation	Utilities	Global Telecommunications Equipment	Macquarie Global Infrastructure
Global Oil & Gas Pipelines	1.000				
Global Transportation	0.280	1.000			
Global Utilities	0.429	0.608	1.000		
Global Telecommunications Equipment	0.151	0.296	0.193	1.000	
Macquarie Global Infrastructure	0.476	0.645	0.997	0.237	1.000

Source: FTSE Group, data as at 28 Feb, 2007

4.4.3 Correlations over 12m

CORRELATIONS BASED ON DAILY PRICE INDEX RETURNS

Index	Global Oil & Gas Pipelines	Global Transportation	Utilities	Global Telecommunications Equipment	Macquarie Global Infrastructure
Global Oil & Gas Pipelines	1.000				
Global Transportation	0.351	1.000			
Global Utilities	0.486	0.607	1.000		
Global Telecommunications Equipment	0.264	0.283	0.347	1.000	
Macquarie Global Infrastructure	0.539	0.651	0.996	0.385	1.000

Source: FTSE Group, data as at 28 Feb, 2007

4.4.4 Correlations over 3 years

CORRELATIONS BASED ON MONTHLY PRICE INDEX RETURNS

Index	Global Oil & Gas Pipelines	Global Transportation	Utilities	Global Telecommunications Equipment	Macquarie Global Infrastructure
Global Oil & Gas Pipelines	1.000				
Global Transportation	0.510	1.000			
Global Utilities	0.586	0.726	1.000		
Global Telecommunications Equipment	0.430	0.433	0.331	1.000	
Macquarie Global Infrastructure	0.650	0.776	0.994	0.394	1.000

Source: FTSE Group, data as at 28 Feb, 2007

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

4.4.5 Correlations over 5 years

CORRELATIONS BASED ON MONTHLY PRICE INDEX RETURNS

Index	Global Oil & Gas Pipelines	Global Transportation	Utilities	Global Telecommunications Equipment	Macquarie Global Infrastructure
Global Oil & Gas Pipelines	1.000				
Global Transportation	0.561	1.000			
Global Utilities	0.727	0.805	1.000		
Global Telecommunications Equipment	n/a	n/a	n/a	1.000	
Macquarie Global Infrastructure	0.779	0.821	0.996	n/a	1.000

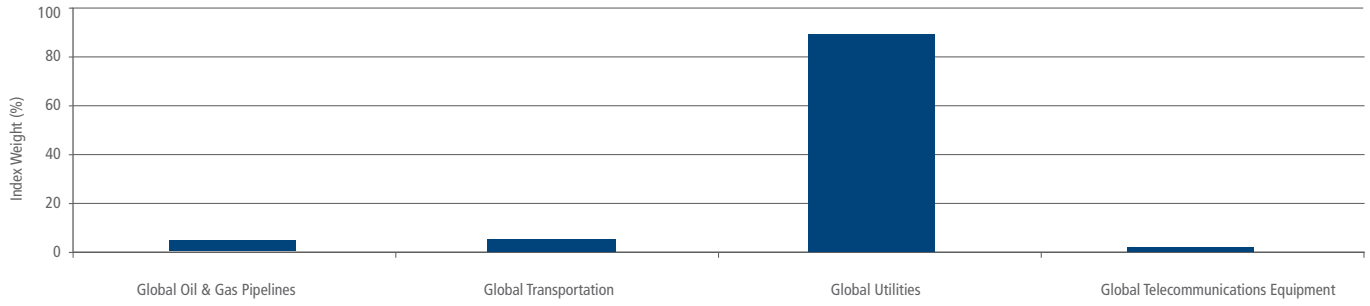
Source: FTSE Group, data as at 28 Feb, 2007

5.0 INDUSTRY CLASSIFICATION BENCHMARK (ICB) – INDEX BREAKDOWN

5.1 Sector Analysis

5.1.1 Macquarie Global Infrastructure Index Sector Breakdown

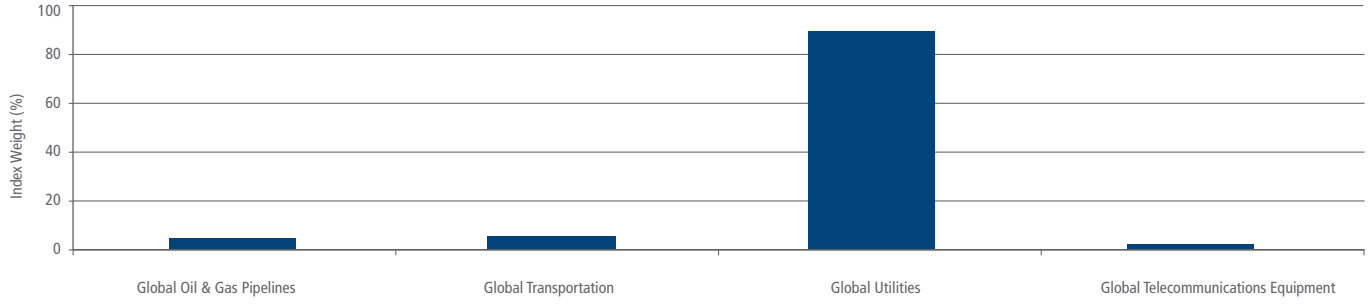
SEC TOR WEIGHTINGS



Source: FTSE Group, data as at 28 Feb, 2007

5.1.2 Macquarie Global Infrastructure 100 Index Sector Breakdown

SEC TOR WEIGHTINGS



Source: FTSE Group, data as at 28 Feb, 2007

6.0 CONSTITUENT DATA

6.1 Weightings

6.1.1 Macquarie Global Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	MGII Weighting	FTSE Global AC Weighting	Difference
1	E.ON	Germany	Gas, Water & Multiutilities	5.11	0.24	4.87
2	Suez	France	Gas, Water & Multiutilities	3.64	0.17	3.47
3	Endesa	Spain	Electricity	3.18	0.15	3.04
4	ENEL	Italy	Electricity	2.85	0.13	2.71
5	Exelon Corporation	USA	Electricity	2.61	0.12	2.49
6	National Grid	UK	Gas, Water & Multiutilities	2.40	0.11	2.29
7	RWE	Germany	Gas, Water & Multiutilities	2.37	0.11	2.26
8	Iberdrola	Spain	Electricity	2.34	0.11	2.23
9	Tokyo Elec Power	Japan	Electricity	2.09	0.10	2.00
10	TXU Corporation	USA	Electricity	1.81	0.08	1.72

Source: FTSE Group, data as at 28 Feb, 2007

6.1.2 Macquarie Global Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	MGI100 Weighting	FTSE Global AC Weighting	Difference
1	E.ON	Germany	Gas, Water & Multiutilities	5.99	0.24	5.75
2	Suez	France	Gas, Water & Multiutilities	4.27	0.17	4.10
3	Endesa	Spain	Electricity	3.73	0.15	3.58
4	ENEL	Italy	Electricity	3.34	0.13	3.20
5	Exelon Corporation	USA	Electricity	3.06	0.12	2.94
6	National Grid	UK	Gas, Water & Multiutilities	2.82	0.11	2.70
7	RWE	Germany	Gas, Water & Multiutilities	2.77	0.11	2.66
8	Iberdrola	Spain	Electricity	2.74	0.11	2.63
9	Tokyo Elec Power	Japan	Electricity	2.45	0.10	2.36
10	TXU Corporation	USA	Electricity	2.12	0.08	2.03

Source: FTSE Group, data as at 28 Feb, 2007

6.1.3 Macquarie Asia Pacific ex Japan ex Australia ex New Zealand Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	Macquarie AP ex Jap ex Aus ex NZ Infrastructure Index Weighting (%)	FTSE AP ex Jap ex Aus ex NZ AC Weighting (%)	Difference in Weighting (%)
1	CLP Holdings	Hong Kong SAR	Electricity	0.16	0.59	-0.43
2	Kepco	Korea	Electricity	0.13	0.48	-0.35
3	Hong Kong & China Gas	Hong Kong SAR	Gas, Water & Multiutilities	0.11	0.40	-0.29
4	Hongkong Electric	Hong Kong SAR	Electricity	0.10	0.36	-0.26
5	China Merchant Holdings (Red Chip)	Hong Kong SAR	Industrial Transportation	0.05	0.20	-0.15
6	Tenaga Nasional	Malaysia	Electricity	0.04	0.16	-0.12
7	NTPC	India	Electricity	0.03	0.13	-0.09
8	Huaneng Power International (H)	China	Electricity	0.03	0.12	-0.08
9	Suzlon Energy	India	Electricity	0.02	0.09	-0.07
10	Malakoff	Malaysia	Electricity	0.02	0.09	-0.06

Source: FTSE Group, data as at 28 Feb, 2007

6.1.4 Macquarie Australasia Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	Macquarie Australasia Infrastructure Weighting (%)	FTSE Australasia AC Weighting (%)	Difference in Weighting (%)
1	Toll Holdings	Australia	Industrial Transportation	21.70	1.07	20.64
2	Macquarie Infrastructure Group	Australia	Industrial Transportation	17.24	0.85	16.39
3	Alinta	Australia	Gas, Water & Multiutilities	12.46	0.61	11.85
4	Transurban Group	Australia	Industrial Transportation	11.17	0.55	10.62
5	AGL Energy	Australia	Gas, Water & Multiutilities	10.72	0.53	10.19
6	Babcock & Brown Infrastructure Group	Australia	Industrial Transportation	5.10	0.25	4.85
7	Macquarie Airports	Australia	Industrial Transportation	4.44	0.22	4.22
8	Contact Energy	New Zealand	Electricity	4.04	0.20	3.84
9	Auckland International Airport	New Zealand	Industrial Transportation	3.24	0.16	3.08
10	Macquarie Communications Infrastructure Group	Australia	Technology Hardware & Equipment	3.10	0.15	2.95

Source: FTSE Group, data as at 28 Feb, 2007

6.1.5 Macquarie Europe Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	Macquarie Australasia Infrastructure Weighting (%)	FTSE Australasia AC Weighting (%)	Difference in Weighting (%)
1	E.ON	Germany	Gas, Water & Multiutilities	12.69	0.77	11.92
2	Suez	France	Gas, Water & Multiutilities	9.04	0.55	8.49
3	Endesa	Spain	Electricity	7.91	0.48	7.43
4	ENEL	Italy	Electricity	7.07	0.43	6.64
5	National Grid	UK	Gas, Water & Multiutilities	5.97	0.36	5.60
6	RWE	Germany	Gas, Water & Multiutilities	5.88	0.36	5.52
7	Iberdrola	Spain	Electricity	5.81	0.35	5.45
8	Veolia Environnement	France	Gas, Water & Multiutilities	4.22	0.26	3.97
9	Centrica	UK	Gas, Water & Multiutilities	3.91	0.24	3.67
10	Scottish & Southern Energy	UK	Electricity	3.55	0.22	3.33

Source: FTSE Group, data as at 28 Feb, 2007

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

6.1.6 Macquarie Japan Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	Macquarie Japan Infrastructure Weighting (%)	FTSE Japan AC Weighting (%)	Difference in Weighting (%)
1	Tokyo Elec Power	Japan	Electricity	23.81	1.05	22.76
2	Kansai Elec Power	Japan	Electricity	14.44	0.64	13.80
3	Chubu Elec Power	Japan	Electricity	13.30	0.59	12.71
4	Tokyo Gas	Japan	Gas, Water & Multiutilities	7.96	0.35	7.61
5	Kyushu Elec Power	Japan	Electricity	6.85	0.30	6.55
6	Tohoku Elec Power	Japan	Electricity	6.77	0.30	6.47
7	Electric Power Development	Japan	Electricity	5.65	0.25	5.40
8	Osaka Gas	Japan	Gas, Water & Multiutilities	4.43	0.20	4.24
9	Chugoku Electric Power	Japan	Electricity	4.40	0.19	4.20
10	Shikoku Electric Power	Japan	Electricity	3.19	0.14	3.05

Source: FTSE Group, data as at 28 Feb, 2007

6.1.7 Macquarie North America Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	Macquarie NA Infrastructure Weighting (%)	FTSE NA AC Weighting (%)	Difference in Weighting (%)
1	Exelon Corporation	USA	Electricity	6.27	0.12	6.15
2	TXU Corporation	USA	Electricity	4.35	0.08	4.26
3	Dominion Resources	USA	Electricity	4.30	0.08	4.21
4	Southern Co	USA	Electricity	3.79	0.07	3.72
5	Duke Energy Corp	USA	Gas, Water & Multiutilities	3.51	0.07	3.44
6	FPL Group	USA	Electricity	3.40	0.07	3.33
7	Entergy Corp	USA	Electricity	2.92	0.06	2.86
8	Firstenergy Corp.	USA	Electricity	2.84	0.06	2.79
9	Public Svc Enterprise Group	USA	Electricity	2.67	0.05	2.62
10	American Elec Power Com	USA	Electricity	2.51	0.05	2.47

Source: FTSE Group, data as at 28 Feb, 2007

6.1.8 Macquarie USA Infrastructure Index

TOP 10 CONSTITUENTS

Rank	Constituent	Country	ICB Sector	MIUSA Weighting (%)	FTSE USA AC Weighting (%)	Difference in Weighting
1	Exelon Corporation	USA	Electricity	6.64	0.27	6.37
2	TXU Corporation	USA	Electricity	4.60	0.19	4.41
3	Dominion Resources	USA	Electricity	4.55	0.19	4.36
4	Southern Co	USA	Electricity	4.02	0.17	3.85
5	Duke Energy Corp	USA	Gas, Water & Multiutilities	3.72	0.15	3.57
6	FPL Group	USA	Electricity	3.60	0.15	3.45
7	Entergy Corp	USA	Electricity	3.09	0.13	2.96
8	Firstenergy Corp.	USA	Electricity	3.01	0.12	2.89
9	Public Svc Enterprise Group	USA	Electricity	2.83	0.12	2.71
10	American Elec Power Com	USA	Electricity	2.66	0.11	2.55

Source: FTSE Group, data as at 28 Feb, 2007

7.0 USING THE INDEXES

The indexes data and licences can support you whatever your investment requirement is. The products casn be used for analysis, benchmarking, trading and product creation.

7.1 Index series overview

OVERVIEW

Fact	Information
Index series universe	FTSE Global All Cap Index
Index series reviews	Semi-annually in June and December
Implementation of changes	Monday after third Friday in review month
Index series type	Market cap weighted, free float adjusted and liquidity screened
Calculation frequency	Daily
Index series currency	Local, GBP, EUR, JPY, USD and AUD
Base date	31 Decemeer, 2003
Base value	5,000
Index distribution	23:30 GMT
End of day distribution	FTP; e-mail
Index rules	Available at www.ftse.com/infrastructure
Historical data	From 01 July, 2000

Source: FTSE Group, data as at 28 Feb, 2007

7.2 Index values and vendor codes

Real-time index values for the Macquarie Global Infrastructure Index Series are available from quote vendors using the following codes:

VENDOR CODES

Index name	Bloomberg Code	Reuters RIC	Thomson Global Topic	Thomson	Telekurs Valoren
Macquarie Global Infrastructure 100 Index	MGII100	<.FTMGII100>	MGII100.FT	MGII100-LN	293712
Macquarie USA Infrastructure Index	MGIUSA	<.FTMIUSA>	=MIUSA.FT	MIUSA-LN	293727

Source: FTSE Group, data as at 28 Feb, 2007

7.3 Exchange Traded Funds (ETFs)

Two Exchange Traded Funds (ETFs) are currently available on the Macquarie Global Infrastructure 100 Index.

CURRENT ETFS AVAILABLE ON THE MACQUARIE GLOBAL INFRASTRUCTURE INDEX SERIES

Launch Date	ETF	Issuer	Exchange	Ticker
31 Dec 2006	SPDR FTSE/Macquarie Global Infrastructure 100 ETF	State Street Global Advisers	AMEX	
23 Oct 2006	iShares FTSE/Macquarie Global Infrastructure 100	Barclays Global Investors	London Stock Exchange	

Source: FTSE Group, data as at 28 Feb, 2007

7.4 Index-linked funds and OTC products

The Macquarie Global Infrastructure Index Series can be used to run a wide range of funds and structured products based linked to the indexes. These include tracker funds, warrants, certificates and futures & options. Announcements will be made as these products become available.

7.5 Data products

For detailed analysis, end of day products are available for each of the indexes.

- Index Valuation Service – index level data on a daily basis
- Constituent Service – constituent data on a daily or monthly basis
- Tracker Constituent Service – highlights changes to the index and constituents and weightings on a daily basis.

8.0 APPENDIX

8.1 Appendix A: About FTSE Group

FTSE Group is a world-leader in the creation and management of indexes. With offices in Beijing, London, Frankfurt, Hong Kong, Madrid, Paris, New York, San Francisco, and Tokyo, FTSE Group services clients in 77 countries worldwide. It calculates and manages the FTSE Global Equity Index Series, which includes world-recognized indexes ranging from the FTSE All-World Index, the FTSE4Good series and the FTSEurofirst Index series, as well as domestic indexes such as the prestigious FTSE 100. The company has collaborative arrangements with the Athens, AMEX, Cyprus, Euronext, Johannesburg London, Madrid, NASDAQ and Taiwan exchanges, as well as Nomura Securities, Hang Seng and Xinhua Finance of China. FTSE also has a collaborative agreement with Dow Jones Indexes to develop a single sector classification system for global investors.

FTSE indexes are used extensively by investors world-wide for investment analysis, performance measurement, asset allocation, portfolio hedging and for creating a wide range of index tracking funds. Independent committees of senior fund managers, derivatives experts, actuaries and other experienced practitioners review all changes to the indexes to ensure that they are made objectively and without bias. Real-time FTSE indexes are calculated on systems managed by Reuters. Prices and FX rates used are supplied by Reuters.

FTSE Group was selected as "Index Provider of the Year" by Global Pensions magazine in 2006, for the second year running. FTSE has recently also been awarded the William F Sharpe Award for Index Innovation, by the Journal of Indexing, Best Index Provider by Structured Products magazine, and Winner of the Exchangetradedfunds.com Global ETF Award for Most Innovative ETF Index Provider.

8.2 Appendix B: Industry Classification Benchmark (ICB)

Securities within the FTSE UK Index Series have been classified using the Industry Classification Benchmark (ICB). The ICB took effect from 2 January 2006.

The ICB brings together two premier global providers of indexes – FTSE Group and Dow Jones Indexes. It is a detailed and comprehensive structure for sector and industry analysis, facilitating the comparison of companies across four levels of classification and national boundaries. The system allocates companies to the Subsector whose definition most closely describes the nature of its business. The nature of a company's business is determined by its source of revenue or where it constitutes the majority of its revenue.

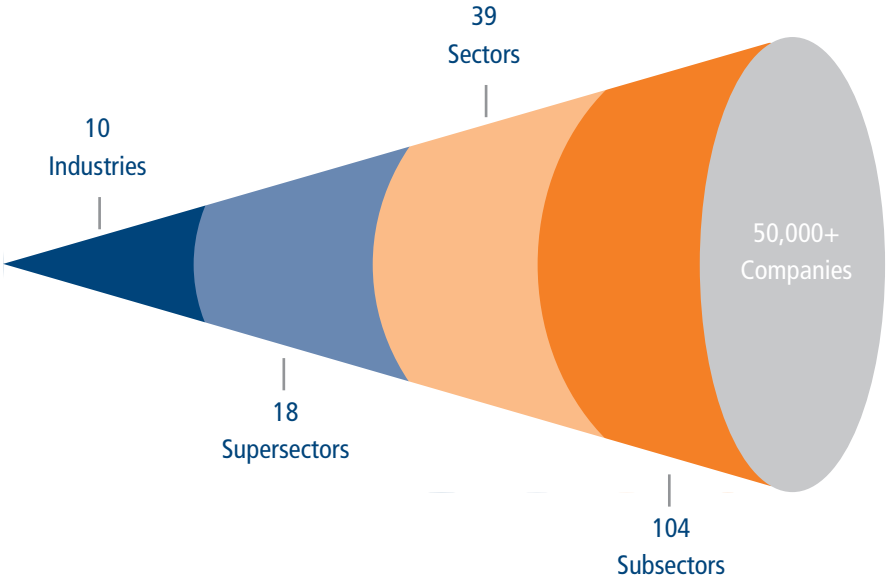
The ICB Universe Database contains over 45,000 securities from over 40,000 companies, from the FTSE and Dow Jones universes. The database covers 67 countries and it is intended that the coverage be increased to 50,000 securities in 2005.

The classification structure consists of four layers:

- 10 Industries help investors monitor broad industry trends
- 18 Supersectors can be used for identifying macroeconomic opportunities for investment and trading decisions
- 39 Sectors provide a broad benchmark for investment managers
- 104 Subsectors allow for more detailed quantitative analysis

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

ICB has been adopted by stock exchanges representing over 65% of the world's market capitalisation.



Industry	Supersector	Sector	Subsector
Oil & Gas	Oil & Gas	Oil & Gas Producers	Exploration & Production
			Integrated Oil & Gas
		Oil Equipment, Services & Distribution	Oil Equipment & Services
			Pipelines
Basic Materials	Chemicals	Chemicals	Commodity Chemicals
			Specialty Chemicals
	Basic Resources	Forestry & Paper	Forestry
			Paper
		Industrial Metals	Aluminium
			Nonferrous Metals
			Steel
		Mining	Coal
			Diamonds & Gemstones
			General Mining
			Gold Mining
			Platinum & Precious Metals
Industrials	Construction & Materials	Construction & Materials	Building Materials & Fixtures
			Heavy Construction
	Industrial Goods & Services	Aerospace & Defense	Aerospace
			Defense
		General Industrials	Containers & Packaging
			Diversified Industrials
		Electronic & Electrical Equipment	Electrical Components & Equipment
			Electronic Equipment
		Industrial Engineering	Commercial Vehicles & Trucks
			Industrial Machinery
		Industrial Transportation	Delivery Services
			Marine Transportation
			Railroads
			Transportation Services
			Trucking
		Support Services	Business Support Services
			Business Training & Employment Agencies
			Financial Administration
			Industrial Suppliers
			Waste & Disposal Services
Customer Goods	Automobiles & Parts	Automobiles & Parts	Automobiles
			Auto Parts
			Tires
	Food & Beverage	Beverages	Brewers
			Distillers & Vintners
			Soft Drinks
		Food Producers	Farming & Fishing
			Food Products
	Personal & Household Goods	Household Goods	Durable Household Products
			Nondurable Household Products
			Furnishings
			Home Construction
		Leisure Goods	Consumer Electronics
			Recreational Products
			Toys
		Personal Goods	Clothing & Accessories
			Footwear
			Personal Products
		Tobacco	Tobacco

ALTERNATIVE BENCHMARKS: MACQUARIE GLOBAL INFRASTRUCTURE

Industry	Supersector	Sector	Subsector
Health Care	Health Care	Healthcare Equipment & Services	Healthcare Providers
			Medical Equipment
		Pharmaceuticals & Biotechnology	Medical Supplies
			Biotechnology
			Pharmaceuticals
Consumer Services	Retail	Food & Drug Retailers	Drug Retailers
			Food Retailers & Wholesalers
		General Retailers	Apparel Retailers
			Broadline Retailers
			Home Improvement Retailers
			Specialized Consumer Services
			Specialty Retailers
	Media	Media	Broadcasting & Entertainment
			Media Agencies
			Publishing
	Travel & Leisure	Travel & Leisure	Airlines
			Gambling
			Hotels
			Recreational Services
			Restaurants & Bars
			Travel & Tourism
Telecommunications	Telecommunications	Fixed Line Telecommunications	Fixed Line Telecommunications
		Mobile Telecommunications	Mobile Telecommunications
Utilities	Utilities	Electricity	Electricity
		Gas, Water & Multiutilities	Gas Distribution
			Multiutilities
			Water
Financials	Banks	Banks	Banks
	Insurance	Nonlife Insurance	Full Line Insurance
			Insurance Brokers
			Property & Casualty Insurance
			Reinsurance
		Life Insurance	Life Insurance
	Financial Services	Real Estate	Real Estate Holding & Development
			Real Estate Investment Trusts
		General Financial	Asset Managers
			Consumer Finance
			Specialty Finance
			Investment Services
			Mortgage Finance
		Equity Investment Instruments	Equity Investment Instruments
		Nonequity Investment Instruments	Nonequity Investment Instruments
Technology	Technology	Software & Computer Services	Computer Services
			Internet
			Software
		Technology Hardware & Equipment	Computer Hardware
			Electronic Office Equipment
			Semicontuctors
			Telecommunications Equipment

FOR FURTHER INFORMATION VISIT WWW.FTSE.COM, EMAIL INFO@FTSE.COM OR CALL YOUR LOCAL FTSE OFFICE:

BEIJING + 86 10 6515 9265 **BOSTON** +1 888 747 FTSE (3873) **FRANKFURT** +49 (0) 69 156 85 144 **HONG KONG** +852 2230 5800

LONDON +44 (0) 20 7866 1810 **MADRID** +34 91 411 3787 **NEW YORK** +1 888 747 FTSE (3873)

PARIS +33 (0) 1 53 76 82 88 **SAN FRANCISCO** +1 888 747 FTSE (3873) **SYDNEY** +61 2 9293 2866 **TOKYO** +81 3 3581 2811

FTSE
THE INDEX COMPANY

Important disclosures:

Recommendation definitions

Macquarie Australia/New Zealand
Outperform – return >5% in excess of benchmark return (>2.5% in excess for listed property trusts)
Neutral – return within 5% of benchmark return (within 2.5% for listed property trusts)
Underperform – return >5% below benchmark return (>2.5% below for listed property trusts)

Macquarie Asia
Outperform – expected return >+10%
Neutral – expected return from -10% to +10%
Underperform – expected return <-10%

Macquarie First South Securities (South Africa)
Outperform – expected return >+5%
Neutral – expected return from -5% to +5%
Underperform – expected return <-5%

Recommendations – 12 months

Note: Quant recommendations may differ from Fundamental Analyst recommendations

Recommendation proportions

	AU/NZ	Asia	RSA
Outperform	44.37%	58.37%	42.60%
Neutral	44.01%	21.30%	46.80%
Underperform	11.62%	20.33%	10.60%

For quarter ending 31 March 2007

Volatility index definition*

This is calculated from the volatility of historic price movements.

Very high–highest risk – Stock should be expected to move up or down 60–100% in a year – investors should be aware this stock is highly speculative.

High – stock should be expected to move up or down at least 40–60% in a year – investors should be aware this stock could be speculative.

Medium – stock should be expected to move up or down at least 30–40% in a year.

Low–medium – stock should be expected to move up or down at least 25–30% in a year.

Low – stock should be expected to move up or down at least 15–25% in a year.
* Applicable to Australian/NZ stocks only

Financial definitions

All "Adjusted" data items have had the following adjustments made:
Added back: goodwill amortisation, provision for catastrophe reserves, IFRS derivatives & hedging, IFRS impairments & IFRS interest expense
Excluded: non recurring items, asset revals, property revals, appraisal value uplift, preference dividends & minority interests

EPS = adjusted net profit / efpowa*
ROA = adjusted ebit / average total assets
ROA Banks/Insurance = adjusted net profit /average total assets
ROE = adjusted net profit / average shareholders funds
Gross cashflow = adjusted net profit + depreciation
*equivalent fully paid ordinary weighted average number of shares

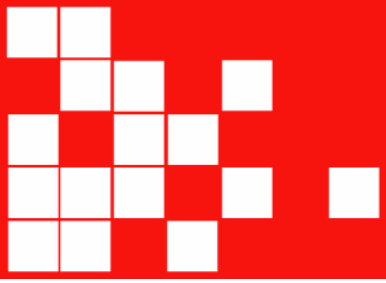
All Reported numbers for Australian/NZ listed stocks are modelled under IFRS (International Financial Reporting Standards).

Analyst Certification: The views expressed in this research accurately reflect the personal views of the analyst(s) about the subject securities or issuers and no part of the compensation of the analyst(s) was, is, or will be directly or indirectly related to the inclusion of specific recommendations or views in this research. The analyst principally responsible for the preparation of this research receives compensation based on overall revenues, including investment banking revenues, of Macquarie Bank Ltd ABN 46 008 583 542 (AFSL No.237502)("Macquarie") and its related entities ("the Macquarie group") and has taken reasonable care to achieve and maintain independence and objectivity in making any recommendations.
Disclaimers: Macquarie Securities (Australia) Ltd; Macquarie Europe Ltd; Macquarie Securities (USA) Inc; Macquarie Securities Ltd; Macquarie Securities (Singapore) Pte Ltd; and Macquarie Securities (New Zealand) Ltd are not authorised deposit-taking institutions for the purposes of the Banking Act 1959 (Commonwealth of Australia), and their obligations do not represent deposits or other liabilities of Macquarie. Macquarie provides a guarantee to the Monetary Authority of Singapore in respect of Macquarie Securities (Singapore) Pte Ltd for up to SGD25m under the Securities and Futures Act (Chapter 289). Macquarie does not otherwise guarantee or provide assurance in respect of the obligations of any of the above mentioned entities. This research has been prepared for the general use of the wholesale clients of the Macquarie group and must not be copied, either in whole or in part, or distributed to any other person. If you are not the intended recipient you must not use or disclose the information in this research in any way. Nothing in this research shall be construed as a solicitation to buy or sell any security or product, or to engage in or refrain from engaging in any transaction. In preparing this research, we did not take into account the investment objectives, financial situation and particular needs of the reader. Before making an investment decision on the basis of this research, the reader needs to consider, with or without the assistance of an adviser, whether the advice is appropriate in light of their particular investment needs, objectives and financial circumstances. There are risks involved in securities trading. The price of securities can and does fluctuate, and an individual security may even become valueless. International investors are reminded of the additional risks inherent in international investments, such as currency fluctuations and international stock market or economic conditions, which may adversely affect the value of the investment. This research is based on information obtained from sources believed to be reliable but we do not make any representation or warranty that it is accurate, complete or up to date. We accept no obligation to correct or update the information or opinions in it. Opinions expressed are subject to change without notice. No member of the Macquarie group accepts any liability whatsoever for any direct, indirect, consequential or other loss arising from any use of this research and/or further communication in relation to this research.
Other Disclaimers: Securities research is issued and distributed by Macquarie Securities (Australia) Ltd (AFSL No. 238947) in Australia, a participating organisation of the Australian Stock Exchange; Macquarie Securities (New Zealand) Ltd in New Zealand, a licensed sharebroker and New Zealand Exchange Firm; Macquarie Europe Ltd in the United Kingdom, which is authorised and regulated by the Financial Services Authority (No. 193905); Macquarie Securities Ltd in Hong Kong, which is licensed and regulated by the Securities and Futures Commission; Macquarie Securities (Japan) Limited in Japan, a member of the Tokyo Stock Exchange, Inc. and Osaka Securities Exchange Co., Ltd and in Singapore, Macquarie Securities (Singapore) Pte Ltd (Company Registration Number: 198702912C), a Capital Markets Services licence holder under the Securities and Futures Act to deal in securities and provide custodial services in Singapore. Pursuant to the Financial Advisers (Amendment) Regulations 2005, Macquarie Securities (Singapore) Pte Ltd is exempt from complying with sections 25, 27 and 36 of the Financial Advisers Act. Economic research is issued and distributed in Australia by Macquarie; in New Zealand by Macquarie Securities (New Zealand) Ltd and in the United Kingdom by Macquarie Europe Ltd. Clients should contact analysts at, and execute transactions through, a Macquarie group entity in their home jurisdiction unless governing law permits otherwise. This research may be distributed in the United States only to major institutional investors and may not be circulated to any other person in the United States. Macquarie Securities (USA) Inc., which is a registered broker-dealer and member of the NASD, accepts responsibility for the content of each research report prepared by one of its non-US affiliates when the research report is distributed in the United States by Macquarie Securities (USA) Inc. All transactions by US investors involving securities discussed in this report must be effected through Macquarie Securities (USA) Inc. The information contained in this email is confidential. If you are not the intended recipient, you must not disclose or use the information in this email in any way. If you received it in error, please tell us immediately by return e-mail and delete the document. We do not guarantee the integrity of any e-mails or attached files and are not responsible for any changes made to them by any other person. Disclosures with respect to the issuers, if any, mentioned in this research are available at www.macquarie.com/research/disclosures.

Auckland Tel: (649) 377 6433
Bangkok Tel: (662) 694 7999
Hong Kong Tel: (852) 2823 3588
Jakarta Tel: (62 21) 515 1818
Johannesburg Tel: (27 11) 343 2258
Kuala Lumpur Tel: (60 3) 2059 8833
London Tel: (44 20) 7065 2000
Manila Tel: (63 2) 857 0888
Melbourne Tel: (613) 9635 8139
Mumbai Tel: (91 22) 6653 3000
New York Tel: (1 212) 231 2500
Perth Tel: (618) 9224 0888
Seoul Tel: (82 2) 3705 8500
Shanghai Tel: (86 21) 6841 3355
Singapore Tel: (65) 6231 1111
Sydney Tel: (612) 8232 9555
Taipei Tel: (886 2) 2734 7500
Tokyo Tel: (81 3) 3512 7900

Available to clients on the world wide web at **www.macquarie.com/research** and through Thomson Financial, Reuters and Bloomberg.

Macquarie Research Equities



MACQUARIE

Research

Automobiles/Auto Parts

Kurt Sanger (Japan, Asia)	(813) 3512 7859
Deepak Jain (India)	(9122) 6653 3157
Liny Halim (Indonesia)	(6221) 515 7343
Toshisuke Hayami (Japan)	(813) 3512 7873
Eunsook Kwak (Korea)	(822) 3705 8644

Banks and Non-Bank Financials

Ismael Pili (Asia)	(65) 6231 2840
Nick Lord (Asia)	(852) 2823 4774
Christina Fok (China)	(852) 2823 3584
Chris Esson (Hong Kong)	(852) 2823 3567
Seshadri Sen (India)	(9122) 6653 3053
Liny Halim (Indonesia)	(6221) 515 7343
Kentaro Kogi (Japan)	(813) 3512 7865
Hwashin Lee (Korea)	(822) 3705 4994
Mark Barclay (Korea)	(822) 3705 8658
Young Chung Mok (Korea)	(822) 3705 8668
Chin Seng Tay (Malaysia, S'pore)	(65) 6231 2837
Gilbert Lopez (Philippines)	(632) 857 0898
Chris Hunt (Taiwan)	(8862) 2734 7526
Matthew Smith (Taiwan)	(8862) 2734 7514
Alastair Macdonald (Thailand)	(662) 694 7741

Chemicals/Textiles

Scott Weaver (China, Taiwan)	(8862) 2734 7512
Jal Irani (India)	(9122) 6653 3040
Kitti Nathisuwan (Thailand)	(662) 694 7724

Conglomerates

Gary Pinge (Asia)	(852) 2823 3557
Gilbert Lopez (Philippines)	(632) 857 0898

Consumer

Ramiz Chelat (Asia)	(852) 2823 3587
Xiaopo Wei (China)	(852) 2823 4741
Nicolas Wang (Hong Kong)	(852) 2823 4625
Unmesh Sharma (India)	(9122) 6653 3042
Sarina Lesmina (Indonesia)	(6221) 515 7339
Duane Sandberg (Japan)	(813) 3512 7867
Christina Lee (Korea)	(822) 3705 8670
Paul Hwang (Korea)	(822) 3705 8678
Woochang Chung (Korea)	(822) 3705 8667
Edward Ong (Malaysia)	(603) 2059 8982
Nadine Javellana (Philippines)	(632) 857 0890

Custom Products

Patrick Hansen (Japan)	(813) 3512 7876

Emerging Leaders

Paul Quah (Hong Kong)	(852) 2823 4627
Saurabh Jain (India)	(9122) 6653 3046
Oliver Cox (Japan)	(813) 3512 7871
Robert Burghart (Japan)	(813) 3512 7853
Paul Hwang (Korea)	(822) 3705 8678
Woochang Chung (Korea)	(822) 3705 8667
Nadine Javellana (Philippines)	(632) 857 0890
Jeremy Chen (Taiwan)	(8862) 2734 7521
Scott Weaver (Taiwan)	(8862) 2734 7512

Insurance

Chris Esson (China, Taiwan)	(852) 2823 3567

Media

Ramiz Chelat (Asia)	(852) 2823 3587
Prem Jearajasingam (Malaysia)	(603) 2059 8989

Metals and Mining

Simon Francis (Asia)	(852) 2823 3590
Rakesh Arora (India)	(9122) 6653 3054
Adam Worthington (Indonesia)	(6221) 515 7338
Christina Lee (Korea)	(822) 3705 8670
Amornrat Cheevavichawalkul (Thai)	(662) 694 7829

Oil and Gas

David Johnson (Asia)	(852) 2823 4691
Scott Weaver (China, Taiwan)	(8862) 2734 7512
Jal Irani (India)	(9122) 6653 3040
Mark Barclay (Korea)	(822) 3705 8658
Edward Ong (Malaysia)	(603) 2059 8982
Kitti Nathisuwan (Thailand)	(662) 694 7724

Pharmaceuticals

Shubham Majumder (India)	(9122) 6653 3049

Property

Matt Nacard (Asia)	(852) 2823 4731
Eva Lee (Hong Kong, China)	(852) 2823 3573
Siddhartha Gupta (India)	(9122) 6653 3048
Chang Han Joo (Japan)	(813) 3512 7885
Gilbert Lopez (Philippines)	(632) 857 0898
Tuck Yin Soong (Singapore)	(65) 6231 2838
Corinne Jian (Taiwan)	(8862) 2734 7529
Monchai Jaturanpinyo (Thailand)	(662) 694 7727

Technology

Warren Lau (Asia)	(852) 2823 3592
Suveer Chainani (India)	(9122) 6653 3045
Damian Thong (Japan)	(813) 3512 7877
David Gibson (Japan)	(813) 3512 7880
George Chang (Japan)	(813) 3512 7854
Yoshihiro Shimada (Japan)	(813) 3512 7862
Do Hoon Lee (Korea)	(822) 3705 8641
Michael Bang (Korea)	(822) 3705 8659
Patrick Yau (Singapore)	(65) 6231 2835
Cheryl Hsu (Taiwan)	(8862) 2734 7522
Daniel Chang (Taiwan)	(8862) 2734 7516
Dominic Grant (Taiwan)	(8862) 2734 7528
Jessica Chang (Taiwan)	(8862) 2734 7518
Nicholas Teo (Taiwan)	(8862) 2734 7523

Telecoms

Tim Smart (Asia)	(852) 2823 3565
Jake Lynch (China, Hong Kong)	(852) 2823 3583
Shubham Majumder (India)	(9122) 6653 3049
Richard Moe (Indonesia)	(662) 694 7753
Nathan Ramler (Japan)	(813) 3512 7875
Joel Kim (Korea)	(822) 3705 8677
Prem Jearajasingam (Malaysia)	(603) 2059 8989
Ramakrishna Maruvada (Philippines, Singapore)	(65) 6231 2842
Dominic Grant (Taiwan)	(8862) 2734 7528
Richard Moe (Thailand)	(662) 694 7753

Transport & Logistics

Paul Huxford (Asia)	(65) 6231 2841
Michael Chan (Asia)	(852) 2823 3595
Anderson Chow (China, Hong Kong)	(852) 2823 4773
Bin Liu (China)	(852) 2823 4761
Eunsook Kwak (Korea)	(822) 3705 8644

Utilities

Sylvia Chan (Asia)	(852) 2823 3579
Gopal Ritolia (India)	(9122) 6653 3055
Adam Worthington (Indonesia)	(6221) 515 7338
Prem Jearajasingam (Malaysia)	(603) 2059 8989
Dante Tinga (Philippines)	(632) 857 0815

Commodities

Jim Lennon	(4420) 7065 2014
Adam Rowley	(4420) 7065 2013
Max Layton	(4420) 7065 2000
Bonnie Liu	(4420) 7065 2014
Henry Liu	(4420) 7065 2014

Data Services

Liz Dinh (Asia)	(852) 2823 4762
Brent Borger (Japan)	(813) 3512 7852

Economics

Roland Randall (Asean)	(852) 2823 3572
Bill Belchere (Asia)	(852) 2823 4636
Eli Polatinsky (Asia)	(852) 2823 4074
Richard Gibbs (Australia)	(612) 8232 3935
Paul Cavey (China)	(852) 2823 3570
Richard Jerram (Japan)	(813) 3512 7855

Quantitative

Martin Emery (Asia)	(852) 2823 3582
Viking Kwok (Asia)	(852) 2823 4735
George Platt (Australia)	(612) 8232 6539
Raelene de Souza (Australia)	(612) 8232 8388

Strategy/Country

Tim Rocks (Asia)	(852) 2823 3585
Daniel McCormack (Asia)	(852) 2823 4073
Desh Peramunetilleke (Asia)	(852) 2823 3564
Jake Lynch (China)	(852) 2823 3583
Seshadri Sen (India)	(9122) 6653 3053
Peter Eadon-Clarke (Japan)	(813) 3512 7850
Eugene Ha (Korea)	(822) 3705 8643
Uday Jayaram (Malaysia)	(603) 2059 8988
Gilbert Lopez (Philippines)	(632) 857 0898
Tuck Yin Soong (Singapore)	(65) 6231 2838
Chris Hunt (Taiwan)	(8862) 2734 7526
Kitti Nathisuwan (Thailand)	(662) 694 7724

Find our research at

Macquarie:	www.macquarie.com.au/research
Thomson:	www.thomson.com/financial
Reuters:	www.rbr.reuters.com
Bloomberg:	MAC GO

Email macresearch@macquarie.com for access

Sales

Regional Heads of Sales

Greg Gordon (Asia)	(852) 2823 3509
Peter Slater (Boston)	(1 617) 217 2103
Michelle Paisley (China, Hong Kong)	(852) 2823 3516
Ulrike Pollak-Tsutsumi (Frankfurt)	(49) 69 7593 8747
Daniel Fust (Geneva)	(41) 22 818 7710
Thomas Renz (Geneva)	(41) 22 818 7712
Ajay Bhatia (India)	(9122) 6653 3200
Stuart Smythe (India)	(9122) 6653 3200
Eugene Ha (Korea)	(822) 3705 8643
K.Y. Nam (Korea)	(822) 3705 8607
Derek Wilson (London) (N Asia)	(44) 20 7065 5856
Julien Roux (London)	(44) 20 7065 5887
Lena Yong (Malaysia)	(603) 2059 8888
Ismael Pili (Philippines)	(65) 6231 2840
Greg Norton-Kidd (New York)	(1 212) 231 2527

Regional Heads of Sales cont'd

Luke Sullivan (New York)	(1 212) 231 2507
Mark Lawrence (New York)	(1 212) 231 2516
Sheila Schroeder (San Francisco)	(1 415) 835 1235
Giles Heyring (Singapore)	(65) 6231 2888
Mark Duncan (Taiwan)	(8862) 2734 7510
Angus Kent (Thailand)	(662) 694 7601
Dominic Henderson (Tokyo)	(813) 3512 7820
Nick Cant (Tokyo)	(813) 3512 7821
Charles Nelson (UK/Europe)	(44) 20 7065 2032
Rob Fabbro (UK/Europe)	(44) 20 7065 2031

Sales Trading

Anthony Wilson (Asia)	(852) 2823 3511
Mona Lee (Hong Kong)	(852) 2823 3519
Stuart Goddard (Europe)	(44) 20 7065 2033
Brendan Rake (India)	(9122) 6653 3204

Sales Trading cont'd

Howard Yoon (Korea)	(822) 3705 8601
Edward Robinson (London)	(44) 20 7065 5883
Robert Risman (New York)	(1 212) 231 2555
Isaac Huang (Taiwan)	(8862) 2734 7582
Kenichi Ohtaka (Tokyo)	(813) 3512 7830

Index Sales

Margaret Hartmann	(612) 8232 9834

Alternative Strategies

Convertibles - Roland Sharman	(852) 2823 4628
Depository Receipts - Robert Ansell	(852) 2823 4688
Derivatives - Vipul Shah	(852) 2823 3523
Futures - Tim Smith	(852) 2823 4637
Hedge Fund Sales - Darin Lester	(852) 2823 4736
Structured Products - Andrew Terlich	(852) 2249 3225

A43692/ASIA.MA