Infrafunds

The rise of infra funds

In the past 18 months there has been more than US$160bn globally ear-marked for infrastructure investments. By **Ryan J Orr**, PhD, executive director, Collaboratory for Research on Global Projects, **Stanford University**.

And yet, infrastructure funds tend to be ignored by analysts in favour of real estate funds, buyout funds and other more seductive forms of private equity. This lack of attention and limelight leaves many basic questions about the funds unanswered. What proportion of the funds have been raised on the private equity template, the IPO model, within pension funds, by governments rich with petrodollars, or by European construction companies in the wake of the PFI initiative? Who are the main players? How are the funds set up? How do they operate? Where are they focused? What strategies do they employ? Why is the boom in new infrastructure funds occurring now? What challenges will the new funds face in the months and years ahead? And where might the industry be headed?

To shed light on these questions, three MBA students enrolled in Global Project Finance at Stanford University set out to catalogue the universe of new infrastructure funds and to survey a handful of their managing directors. Ambitious for a term project? Indeed, but these are not ordinary students. Before business school, Josh Raffaelli was employed as an analyst at JPMorgan; Connor Kidd IV served as a management consultant; and Andrew Cantor worked with the New York Jets on financing a new stadium. With such strong backgrounds, it is not surprising that the students had better luck attracting job offers from many of the funds than they did in collecting data for the study!

The database of new infrastructure funds was compiled using search tools such as Google, Lexis Nexis, and EBSCO to scour company websites, international press reports and trade magazines. Following the desk study, we contacted a random sample of 12 managing directors. Five of the managing directors agreed to provide data and responded to our questions about fund set-ups, investment strategies, and operations. The others expressed reservations, the most common of which was that their fund was still too new to participate – in many cases still in the money-raising stages – and that the industry was still too formative and secretive for data to be shared openly.

For the purposes of the study, we define infrastructure funds to include those funds focused on making direct financial investments in projects across the following sectors: power (renewables, coal-fired, gas turbine and nuclear), water (treatment and distribution), transportation (airports, ports, roads, parking lots and rail links), social (prisons, hospitals and schools), and utilities (gas distribution, electricity transmission, fixed-line telephone and mobile telephone). We intentionally exclude from our definition funds focused on upstream oil and gas, mineral and resource exploitation; funds targeting infrastructure development companies and/or operators, and infrastructure operators.

This article summarises key findings from the assessment and discusses the questions noted above about how the industry has evolved and where it may be heading.

The universe of infrastructure funds

Infrastructure funds are not entirely a new phenomenon. Several of the early infrastructure funds launched during the 1990s now have more than US$5bn under management (see Exhibit 1). One of the largest is Macquarie Bank, with US$22bn diversified across multiple funds, countries and infrastructure sectors.

Following in the footsteps of the pioneering funds, a tidal wave of 72 new infrastructure funds have been launched in the past 15 months (see Exhibit 2). Altogether, these new funds have raised – or are expecting raise – capital commitments in excess of US$120bn. By comparison, established infrastructure operators have only US$40bn in capital available to invest in projects (see Exhibit 3).

Approximately half of **the new funds** follow the private **equity model**

TABLE 1 - THE PIONEERING FUNDS

Launch date[1]	Institution/fund name	Fund(s) size[2]	Fund focus
1994	Emerging Markets Partnership Global	US$6bn across eleven funds	Emerging markets, all sectors. Different funds target different regions.
1994	Hastings Fund Management	US$4.3bn	Industries – transportation & utilities; has funds that are publicly traded
1997	Barclays Private Equity	~US$1.94bn across five funds	Greenfield and brownfield infrastructure; focus on energy infrastructure
~1997	Macquarie	~US$22bn under management across multiple funds	Focus on transportation, water, telecom and utilities
1997	AMP Capital Investors	A$3bn (~US$2.5bn) across eight funds	Focus on utilities, transport and social infrastructure
2001	Galaxy Fund	€175m (~US$231m)	Transportation; airports; regional focus on Europe
2002	Babcock & Brown Infrastructure Fund	A$6.3bn (~US$5.25bn)	Focus on energy distribution and transport; ASX listed; Babcock & Brown also have a number of other specialty funds for wind, power, environmental investments and PPPs

1 Approximate launch dates are based on historical records available on fund websites.
2 Approximate fund(s) sizes are \based on self-reported data available on fund websites.

There are six or seven funds that originated from small specialist teams nested within larger banks.

Infrastructure funds vary in expected size from a meagre US$100m to upwards of US$5bn (see Exhibit 4). Many of the new funds are still in the money-raising stage, so actual commitments may vary from the targets announced at launch. Nonetheless, of the 72 funds in the database, 20 had an expected value of less than US$500m, 17 between US$500m and US$1bn; 13 between US$1bn and US$2.5bn; 14 between US$2.5bn and US$5bn; and just four larger than US$5bn. The two largest, Borealis and CPP – both Canadian pension funds – have a whopping US$10bn and US$7bn, respectively, allocated to infrastructure investing.

In terms of geographic distribution, 56 of the 72 funds tend to be bunched across four main world regions: US, Europe, MENA countries, and India (see Exhibit 5). The remaining funds focus on Africa, Asia and Australia, and report a global focus without a clear target market. So far in 2007, the hot market is India, with five of the nine funds that were announced during the first quarter having a designated India focus. It is worth noting that 18 of the 20 largest funds are focused primarily on the US or European markets.

Approximately one half of the new funds follow the private equity model and seek to raise capital from large institutional investors. However, not all follow the private equity model. Approximately eight of the funds are led by insurance companies or pension funds that invest their own capital; at least seven of the funds were raised through IPOs on major stock exchanges in London, Sydney and New York.

There are also six or seven funds that originated from small specialist teams nested within larger commercial banks, asset management companies, or family offices. Then there are half a dozen or so funds that grew either from the transformation of contractors in the UK, or from the needs of superannuation funds in Australia. A few of the MENA funds consist primarily of petrodollar investments from regional governments. Several of the new funds involve joint ventures or strategic partners. The US$272m Zones Corp Fund is a 75:25 equity joint venture between Abu Dhabi Commercial Bank and Macquarie, a blend that combines local capital with global management expertise. The US$2bn fund that is being set-up by IDFC, Citigroup and Blackstone will effectively channel US capital into India, with the aid of a well-established local Indian partner. The DLF Laing O'Rourke JV is a 50:50 partnership between a leading UK infrastructure contractor that can build technologically advanced infrastructure systems with a politically connected Indian real estate developer.

A closer look at five funds

How are the new infrastructure funds set-up in terms of expected deal flow, deal size, returns, and time horizons of investments and returns? Despite the small sample of five funds, which represents just 7% of the new funds raised in the past 15 months, the data show a very different profile for funds in developed countries versus those in developing countries (see Exhibit 6).

The two funds focused on emerging country investments (Funds 4 and 5) expect to make 20 to 25 deals with an average size of US$2.5m to US$5m per investment and to achieve returns of 15%–18%, or more. In contrast, the three funds focused on developed country markets (Funds 1, 2 and 3) expect to make a smaller number of deals – eight to 20 – of a much larger average deal size – US$150m to US$300m – with returns in the 10%–15% range.

Strikingly, the average size of an infrastructure investment in a developed country is 64x larger than that in a developing country. Factors that do not differ systematically across developed and developing country settings are the time periods of the planned investments and the time horizons of the expected returns.

Across all five funds, the investment time period is consistently in the three-year to five-year range, with the only exception being a fund focused on acquiring developed country brownfield assets, which expects to be fully invested in just one to two years. Once fully invested, the time horizon of expected returns across the funds ranges from four to seven years for Fund 2, 3 and 4; eight to 12 years for Fund 1; and a maximum of 14 years for Fund 5.

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TABLE 2 - NEW FUNDS ANNOUNCED IN THE PAST 18 MONTHS

Institution/ fund name	Fund size (US$m)[1]	Home office	Fund focus
2i Capital Group	300	India	In conjunction with Oman-based Amwal Investment SAOC, will launch a seven-yr shari'ah-compliant Indian Infrastructure Development Fund.
3i Infrastructure Ltd.	2,574	UK	3i Infrastructure Ltd will take equity investments in entities owning infrastructure businesses and assets, in Europe, North America and Asia.
ABN Amro Infrastructure Capital Equity Fund	1,350	Netherlands	Focus on European equity investments in PFI/PPP-style projects, especially schools, ports, toll roads and prisons.
Abraaj Capital	2,000	UAE	Shari'a-compliant Infrastructure and Growth Capital Fund (IGCF), co-sponsored by Deutsche Bank and Ithmaar Bank, targeting IRR of 20% and life of 10 year. (US$500m committed as of Dec. 31, 2006)
Ahorro Corporacion Infraestructuras	435	Spain	Focus on infrastructure in Spain.
AIG	3,000	USA	AIG has allocated capital from its financail products business towards infrastructure.
AIG Highstar Capital	2,000	USA	Over the years, AIG has had various infrastructure funds in cooperation with Bechtel, EMP, and others. AIG Highstar is one such fund.
Alinda Capital Partners LLC	3,000	USA	Regional focus on brownfield assets in North America and Europe. When first announced the fund was targeting US$1bn, but now is rumoured to be raising up to US$3bn.
AMP Capital Investors	500	Australia	Will invest in Asian power and port projects; more than half destined for India.
Atherstone India Invest (AII)	1,000	India	AII is a JV between the Atherstone Group based in Mumbai and Switzerland-based India Invest focussed on investing in infrastructure service companies.
Australian Infrastructure Fund	316	Australia	Focus on transport; managed by Hastings.
Axa IM Infrastructure	680	France	The Infrastructure Group currently manages €1.2bn in assets. Focused on project finance and PPP transactions.
Babcock & Brown	1,700	Australia	Focus on energy transmission and distribution and transportation in Australia and internationally.
Barclays European Infrastructure Fund	362	UK	Focus on all aspects of European infrastructure development, with specialist funds for both Greenfield and Brownfield projects.
Barclays Private Equity	1,350	UK	Focus on new infrastructure development.
Benetton family (thru Edizione Holding)	0	Italy	The family currently controls 37% of Autostrade S.p.A., an operator of nearly two-thirds of Italy's motorways.
Borealis	10,000	Canada	Manages OMERS infrastructure investments with a primary focus in Canada.
Caisse de Dèpôt	5,000	Canada	Focus on energy, water, transporation, and gas distribution in Europe and North America.
Carlyle Group	1,000	USA	U.S. infrastructure, such as rail, airports, water assets, schools, hospitals.
Carlyle Group and Riverstone Holdings	685	USA	Renewable Energy Infrastructure Fund on April 5.
Carlyle Riverstone Global E&P Fund III	3,800	USA	Oil, power and natural resources.
Challenger	800	Australia	Invests in a diversified portfolio of global infrastructure assets.
Citigroup, Blackstone and IDFC	2,000	USA-India	Telecom, power, oil and gas and other value added infrastructure projects in India; the fund will raise another US$3bn in debt.
Citigroup	3,000	USA	Started within the private equity arm of Citigroup; fcus on North America and Europe.
Cityspring	150	Singapore	IPO on the Singapore exchange;majority shareholder is Temasek. Focus on gas distribution and seawater desalination in Singapore.
CPP Investment Board	7,000	Canada	The Canadian Pension Plan has allocated up to 10% of its US$80bn reserve fund to infrastructure.
DB RREEF	1,350	USA	The infrastructure and real estate arm of Deutsche Asset Management, wwill concentrate on western European assets, spanning transport, communications and utilities.
DIC & HSBC MENA Infrastructure Fund	500	UAE	Greenfield and brownfield Infrastructure.
DLF Laing O'Rourke JV	1,500	UK-India	Plan to invest in an array of projects in India, including railways, national highways, airports and oil, gas, water pipelines.
Emerging Capital Partners MENA Fund	225	USA	An offshoot from EMP Global, the fund focuses on infrastructure projects in Northern African countries and Middle East.
F2i Infrastructure Fund	2,700	Italy	Focus on Italian roads, airports, ports, parking lots, and energy transmission grids. Aims to list in 5 years.
FIDE PPP	272	France	Focus on infrastructure.
First Irish Infrastructure Fund	204	Ireland	A joint AIB/EIB fund established for the purpose of investing in PPP projects and private sector infrastructure developments in Ireland and across Europe.
Fondo PPP Italia	163	Italy	An Italian equity fund devoted to investing in PPP projects.
GE and Credit Suisse	1,000	USA	They will each invest US$500m in a new fund to invest in power plants, pipelines, airports, railroads and toll roads located across the globe.
Goldman Sachs	6,500	USA	This fund was rumoured to be US$3bn when first announced, but closed at US$6.5bn on Feb. 1, 2007; Regional focus of North America and Europe.
Gulf One Infrastructure Fund	2,000	Bahrain	Water and other infrastructure projects in the GCC countries and the MENA region.
Hastings Infrastructure Fund	45	Australia	Focus on roads, airports, electricity, gas, alternative waste treatment.

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TABLE 2 - NEW FUNDS ANNOUNCED IN THE PAST 18 MONTHS (CONTINUED)

Institution/ fund name	Fund size (US$m)[1]	Home office	Fund focus
HBOS, Uberior	990	Scotland	Uberior operates as a holding company for investments arranged by Bank of Scotland's Joint Ventures team, a part of Halifax Bank of Scotland's Corporate division.
Henderson Secondary PFI Funds I	660	UK	Global Investment in Europe, Asia and America.
Henderson Secondary PFI Funds II	1,129	UK	Global Investment in Europe, Asia and America.
HSBC Infrastructure Company	253	UK	Focus on the UK PFI/PPP market, including government offices and facilities, schools, hospitals and transport links.
IDFC	630	India	Greenfield and brownfield infrastructure in India. This is their second fund. It was originally announced at US$350-450m but closed at US$630m.
IL&FS Managers & ADIC Infrastructure	1,000	Abu Dhabi	Energy, roads, power and water supply in North Africa and West Asia.
Infrastructure Investors (I2)	898	UK	Focus on utilities, healthcare, education in UK and European countries.
Innisfree funds (x5)	2,357	UK	Focus on health, education, transport and government accomodations.
Japan Infrastructure Group	0	Japan	A partnership between Macquarie and Japan Development Bank to focus on Japanese infrastructure.
JP Morgan	2,000	USA	Announced an infrastructure group to complement its real estate group.
KKR	3,000	USA	Focus on ports, utilities, roads and airports.
Macquarie Airports (Map/MAG)	4,080	Australia	Focus on global airport investments.
Macquarie European Infra. Fund II	6,300	Australia	Infrastructure in Europe. This fund closed in May 2007.
Macquarie Infra. Partners	4,000	Australia	Infrastructure in North America. This fund closed in May 2007.
Macquarie Infrastructure Group	1,000	Australia	Dedicated India fund.
Macquarie Korea Infrastructure Fund	964	Korea	Fund closed; capital raised in an IPO in South Korea.
Meridiam Infrastructure	810	USA	Transport, public facilities and environmental PPP projects in Europe and the USA.
Merrill Lynch	5,000	USA	N/A
Mill Group JV	204	UK	Main focus is in accommodation projects delivered through the Public Private Partnership Programme, particularly schools.
Morgan Stanley	3,000	USA	Dedicated infrastructure fund.
Ontario Teachers Pension Plan	3,500	Canada	Have US$6.2bn in infrastructure under mgmt.
Pan African Infrastructure Development Fund	1,000	South Africa	Telecoms, transport, and energy in Africa.
Peugeot family	0	France	The family has participated as a financial investor in large club deals to acquire infrastructure assets.
Plenary Group	0	Australia	Investor, developer and operator with a focus on North American and Australian PPP projects. Strategic alliance with Deutsche Bank.
Quayle Munro, PFI Infrastructure Fund	88	Scotland	Focus is on schools, hospitals, street lighting and MOD housing where the economic return is not highly or totally dependent on demand.
Royal Bank Project Investments, RBS	50	Scotland	Estimated capital available to support financing opportunities in the power, oil, gas and infrastructure sectors.
Santander Infrastructures	218	Spain	Fund aimed at institutional investors and focused on investment in non-listed infrastructure companies and infrastructure projects.
SEASAF	250	Malaysia	A private equity fund investing in the infrastructure in South East Asia, founded by CIMB and Standard Bank.
Secondary Market Infrastructure Fund	802	UK	Seeks infrastructure assets throughout Western Europe at varying stages of development. HSBC appears to have committed $500 m.
South Europe Infrastructure Equity Finance	204	Luxembourg	Dexia and European Investment Bank, targets medium size PPP transactions predominantly in France, Italy, Spain and Portugal.
Star Capital Partners I	790	UK	Focus on Transportation, Communications, Services, Energy.
Star Capital Partners II	1,156	UK	Focus on Transportation, Communications, Services, Energy.
Terra Firma	5,000	UK	TF has two funds–TFCPI and TFCPII–under management and has invested more than US$10bn.
ZonesCorp Infrastructure Fund	272	Abu Dhabi	A joint venture between Abu Dhabi Commercial Bank (75% equity) and the Macquarie Bank Group (25% equity) to focus on the Abu Dhabi emirate.

1 Fund sizes are estimates based on published expectations at launch and interviews with industry experts.

How do investment strategies differ? We set out to compare the funds on the following dimensions: profile of prototypical investors, maturity of target markets, type of target projects, portfolio allocation, use of leverage, source of return, and willingness to take minority ownership stakes (see Exhibit 7).

Typical investors include pension funds, insurance companies, banks, and high net worth individuals. Two of the five funds report investors with a specific geographic preference.

In terms of market maturity and portfolio allocation, three of the funds target mature developed country

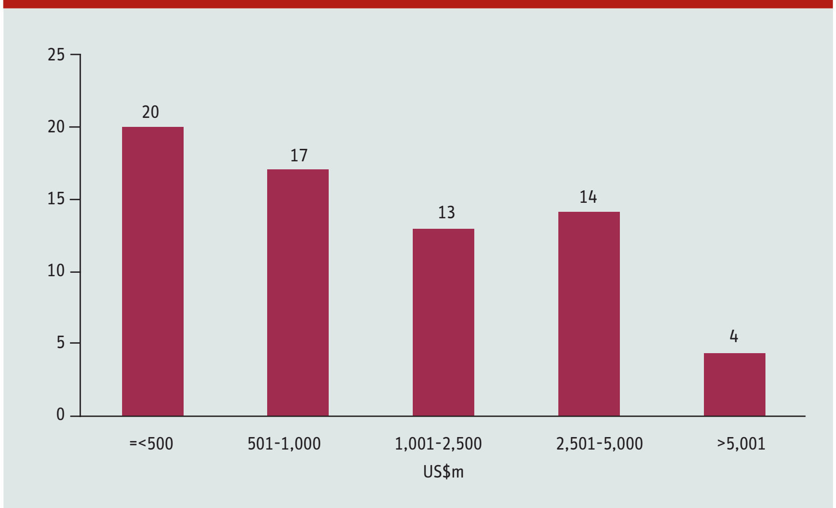
Macquarie plays an **important role** in bundling large **portfolios**

TABLE 3 - ESTABLISHED OWNER-OPERATORS

Institution/ fund name	Fund size (US$m)[1]	Home office	Fund focus
Sacyr Vallehermoso Group, Ena-Intinere	8,800	Spain	Has more than US$80bn under management, primarily in European toll road assets.
Transurban	1,500	Australia	Has approx US$4.5bn under management in toll road assets.
Abertis	10,000	Spain	Has approx US$10.8bn under management.
Cintra SA	6,300	Spain	Has more than US$20.4bn under management, primarily in European toll roads but also in US and Canada; also holds parking structures.
Grupo Ferrovial	11,000	Spain	Has more than US$40bn in infrastructure assets under management, including BAA and 6 other major international airports.
Vinci Concessions	4,000	France	Focuses on infrastructure concessions in Europe with recent entry to US market.
Hochitef Airports	415	Germany	Focus on investments in airports worldwide.
Amey Ventures	0	UK	Focus on long term investment for 25-30 year in health, education and transport infrastructure.
Balfour Beatty Capital Projects	198	UK	Focus on roads, hospitals, schools and other infrastructure.

1 Fund sizes are estimates.

TABLE 4A - NUMBER OF NEW FUNDS, BY SIZE



Four of the funds do their own due diligence; Fund 3 does not do its own due diligence.

markets, with an emphasis on transport, where they argue that political, legal and financial uncertainties are less severe; two of the funds seek emerging markets investments, with an emphasis on telecom and conventional power, where they argue that greater risks are justified by greater expected returns. Portfolio allocation varies considerably.

Three of the five funds specialise in one sector and have more than 50% of their portfolios allocated to that sector – Fund 1 and 2 both favour transportation and Fund 5 concentrates on conventional power. In contrast, Fund 3 and 4 have a much broader mandate for general infrastructure: Fund 3 is the most diversified, with all sector allocations falling below 20%; meanwhile Fund 4 allocates 21%–30% to transport, social and other infrastructure and less than 20% to conventional power, water and telecom. Transport is the only sector that consistently attracts attention across all five funds.

Leverage at the fund level is employed by two of the developed country funds. The one reports leverage of 50%–80% through bank loans. The other reports leverage of 65%–80% through bank loans, securitisation and bonds.

In terms of source of returns, Funds 2, 3 and 5 expect to derive a substantial proportion of their returns - 40%, 50%–75% and 40%, respectively - from financial structuring as opposed to improvements in operating efficiencies.

A respondent at the fourth fund noted: “We don't think of it this way - different transactions are different bets - sometimes leverage, sometimes revenue growth, sometimes margin improvement, sometimes all of the above.”

All five funds are willing to consider minority stakes in their investments: Fund 1 and 5 will go in with less than 10% on very large deals, Fund 3 accepts positions in the 11%-30% range, and Fund 2 and 4 require at least a 31%-50% stake.

How are the funds operations set up? Four of the five funds employ between nine and 16 people, not including consultants; Fund 1 employs more than 30 people. The top management teams typically have advanced postgraduate degrees as well as direct experience in the fields of infrastructure development and finance.

Four of the funds do their own due diligence; Fund 3 does not do its own due diligence and presumably relies on specialist consultants. The funds each have their own preferred set of legal and due diligence advisers, with no overlap.

Finally, with respect to constraints perceived in achieving expected returns, the three developed country funds cite irrational exuberance, surplus capital, highly competitive auctions and upwards pressure on pricing in the market. In contrast, the primary concerns faced by the developing country funds are entry valuations and political risks.

Big picture questions

1 - Why is the boom in new infrastructure funds occurring now? The rise of the new funds appears to be conditioned

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by a number of macro trends in the global economy:

▶In recent decades, cash-strapped governments, one country, province, state and local jurisdiction at a time, have enacted legislation enabling privatisation or public-private partnerships of various forms, creating an opportunity for private participation in infrastructure that did not exist just 25 years ago;

▶With the success of opportunistic private equity and real estate funds, it is natural for their promoters to extend this model to new sectors and geographies;

▶Today, in the current economic environment of readily available capital and low interest rates, there is a general move among institutional investors away from stocks and bonds and towards alternative investment products - such as infrastructure - in a search for yield;

▶Pension funds are beginning to think of infrastructure as a substitute for long duration fixed income and new funds are learning to cater to this demand;

▶Over the next 10 years, forecasters consistently agree that there will be more than 1bn new arrivals to the planet and at the same time the rise of a large middle class in many developing countries, which should create trillions of dollars of demand for new infrastructure services;

▶Pioneering funds – such as Macquarie Bank – have posted strong returns on large pools of capital and others may be jumping onto the bandwagon;

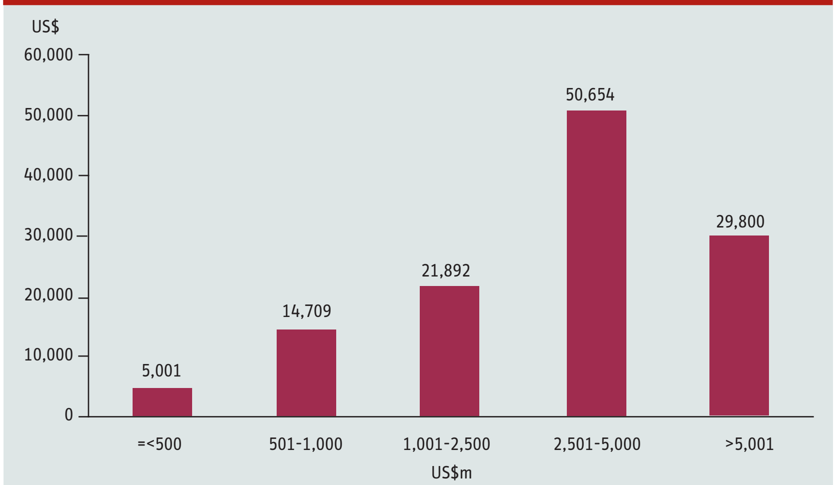
▶Macquarie's biggest effect on the market may have been through the creation of a seemingly bottomless well of liquidity; in an asset class that traditionally was extremely illiquid, Macquarie plays an important role in bundling and securitising large diversified portfolios of infrastructure assets, a model that both creates liquidity and a comforting exit strategy for all of the new funds should they ever need to divest quickly;

▶The extraordinary expansion in China is in large part due to its massive centrally planned infrastructure investments and other developing country governments with growth aspirations and capital reserves may well be attempting to replicate these successes through the establishment of designated infrastructure funds;

2 - What are the reasons typically given for infrastructure investing and the infrastructure fund format?

▶In addition to the factors already mentioned, the reasons given for investing in infrastructure typically include: rising population and strong demand even in times of sluggish economic growth; attractive risk adjusted yields; strong, predictable, inflation-linked cash flows; close compatibility with pension funds and insurance companies that require high quality, long-term, income-oriented investments to match their long duration liabilities; lack of government bonds; and lack

TABLE 4B - DOLLAR VALUE OF NEW FUNDS, BY SIZE



of correlation to equity and bond markets. It is important to distinguish between the compelling case for infrastructure investing from the argument that these investments should be structured into funds, as is now common in real estate and private equity.

▶Some of the more persuasive reasons for the fund format are as follows: the vehicles and the structuring process for mobilising and using debt and equity for major infrastructure initiatives is similar to those of other private equity funds and since these methods exist and are well known there is a natural tendency to extend the types of assets that funds invest in; arguably the greatest threat to the success of most infrastructure investments is political risk and while investors have limited influence over the likelihood that they will face expropriation or creeping expropriation on a single project, they can use the fund format and large-scale diversification across sectors and geographies to mitigate the consequences of political risk at the portfolio level; funds are well-positioned to participate in very large projects through minority investments in "club" consortia that dilute risk exposure; infrastructure investing requires specialist due diligence and management skills that may not be readily at hand within the investment team of a small pension or insurance fund and these skills may be aggregated in infrastructure funds; and finally, the decision timeframe to invest in a deal is usually tight and inflexible and involves significant sunk due diligence costs – infrastructure funds are set up to investigate opportunities quickly and efficiently and can commit large amounts of capital in a short time-frame.

3 - What challenges will the new funds face in the months and years ahead? Although the formation of a whole family of new infrastructure funds is an exciting development in the marketplace, concerns persist:

> Pension funds are beginning to think of infrastructure as a substitute for long duration fixed income.

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▶The biggest concern expressed by the managing directors in the interviews – as well as in recent articles published by S&P and FT – was that in the short run there are too many new funds, all of them hungry for their first deal, driving up prices, and driving down yields in a market with a limited number of existing assets for sale or new assets under development. While we agree that hyper-competition could affect the short-run health of the industry, in the longer-term this concern seems muted. Indeed, the US$160bn in capital build-up for infrastructure, even if it were levered-up with 80% debt at the project level, would fund just US$800bn in new projects, which is only 3%–8% of the US$10trn–$30trn global demand for infrastructure. So there's a lot of room for continued growth and greater specialisation and differentiation of the funds as the industry matures.

▶Perhaps a deeper concern – and deeper because not one managing director acknowledged it as such in our interviews – is that returns for many of the funds, which are derived from leverage and financial structuring, depend on the persistence of historically low rates of interest. In the long run, should interest rates go up, cashflows, debt coverage ratios and returns would deteriorate as an increasing share of operating revenue would go to service debt. For example, consider the financial model for a conventional power plant with an 80:20 debt to equity ratio, a 10-year loan term, and an operating model that is representative of the industry. When interest rates are at 6%, equity returns are in the 16% range. But if interest rates would rise to 10%, returns would drop to 11%. And if interest rates would go as high as 15%, returns would plummet to 4%. This scenario would be even more problematic if there were leverage at the fund level.

▶A concern noted in the work of the Stanford Roundtable on Emerging Markets' Infrastructure, is that infrastructure assets are enormously complex – politically, socially, legally, and technically; a very different profile from the T-Bills and stock certificates that are more familiar to financial investors. In both developed and developing country contexts, these assets are very heavily embedded within a host societal context with real people and politicians who hold cognitive and emotional affinities that not only influence how the assets get funded, constructed and operated but that are constantly shifting with the ebb and flow of broader social mores and political pressures. These assets cannot be managed with a passive sit-and-watch approach. Sovereign risk in the

TABLE 5A - NUMBER OF NEW FUNDS BY REGION

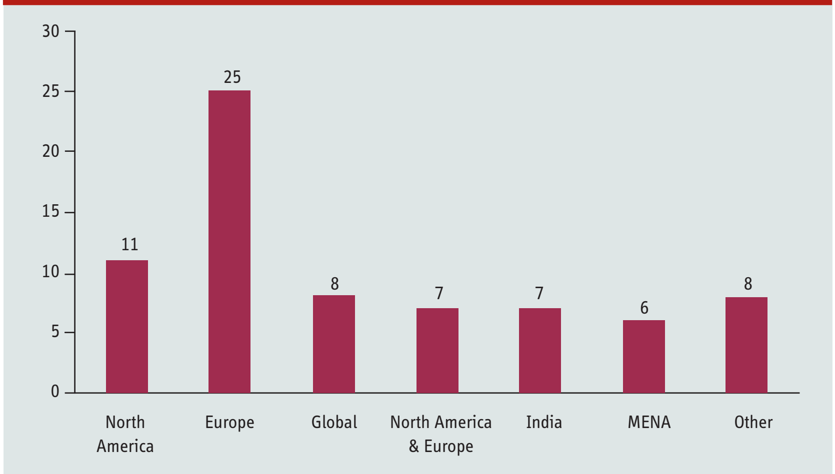

TABLE 5B - DOLLAR VALUE OF NEW FUNDS, BY REGION

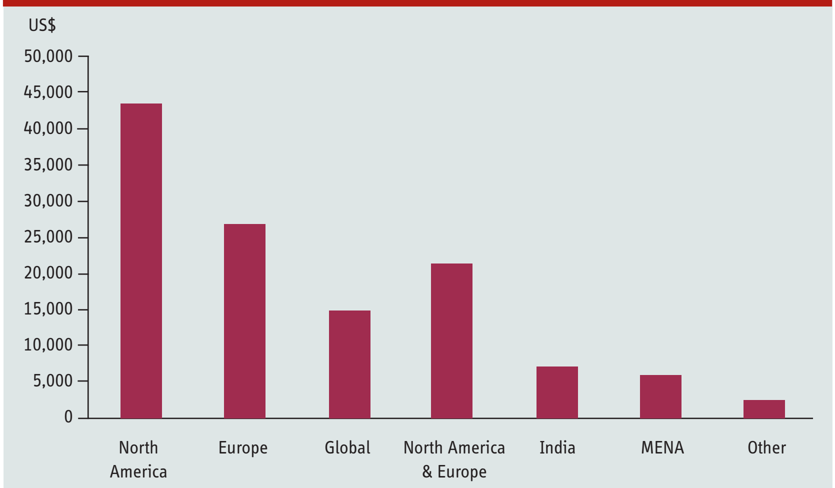

TABLE 6 - DEALS, RETURNS, TIME HORIZONS

Fund size, deals, returns, time horizon	Fund 1	Fund 2	Fund 3	Fund 4	Fund 5
Size of fund (US$bn)	3	1.5	2	0.63	1
Number of planned investments	7-9	8-12	8-12	25	20
Average size of deal (US$m)	370	150	200	2.5	5
Time period of planned investments (years)	3	5	1-2	3	5
Expected return (%)	10-15	11-14	11-14	>18	15-18
Time horizon of expected returns (years)	14 max	5	4-7	4-7	8-12

Returns from **infrastructure are** not likely to be in the **form of appreciation**

There are a number of differences that make infrastructure projects less suitable for the fund structure.

form of the nature and extent of government regulation and intervention, which differs around the world, is an important infrastructure investment consideration as it can be a key driver of value and returns. Research at Stanford shows that following the Asian Financial Crisis, strategic infrastructure investors with strong multilateral and local partners were much better off in renegotiating and restructuring projects than other more passive financial investors. Thus, infrastructure investors must not only be savvy enough to acquire and operate assets, but also to artfully engage in the dynamics of the never-ending public policy debate. Strikingly, many of the new funds appear to lack these specialised skills sets, and this is a serious concern.

▶A final concern is that while investing in infrastructure projects may be compelling, structuring these investments into opportunistic infrastructure funds may be less so. In particular, there are a number of differences that make infrastructure projects less suitable for the fund structure than other types of opportunistic private equity – particularly the lack of liquidity in the sector; the fact that infrastructure is continually subject to regulatory/political risk concerns over its entire lifecycle, and not, as in the case of real estate, just during the development/entitlement stage; the fact that returns from infrastructure are not as likely to be in the form of capital appreciation, as they are in real estate, but in the form of cashflow income from operations; the huge need for strategic management in infrastructure, and yet, the lack of such specialist skills within most funds; and finally, while fund vehicles are capable of raising billions of dollars, the fact that at that size they are much more oriented towards financial engineering, restructuring and cyclical investment bets rather than towards operating the underlying assets or developing strategies to reposition and redevelop.

Where is the industry headed?

The following developments are foreseeable, as the infrastructure fund industry moves from adolescence to adulthood:

▶Decoupling of owners and operators – Historically, the ownership and operation of private infrastructure has been aggregated into large infrastructure operators, single firms that carried out both their own and operator functions. Perhaps the single most interesting aspect of the formation of a whole new family of private infrastructure funds is the potential for the unbundling of these functions. A similar decoupling has already taken place in real estate, where today we have an almost taken-for-granted distinction between mall owners and retailers, hotel trusts and hotel management companies, and real estate funds and real estate management companies. As of yet, in the infrastructure space, this separation has not happened; we have yet to see the rise of a set of specialist infrastructure operators who are not also

TABLE 7 - INVESTMENT STRATEGY

Investment strategy	Fund 1	Fund 2	Fund 3	Fund 4	Fund 5
Target countries (developed, middle, emerging)	Developed	Developed	Developed	Emerging	Emerging
Target projects (greenfield vs brownfield)	Both	Brownfield	Brownfield	Both	Both
Target investor profile	All institutional - pension funds, insurance companies, banks	High net worth individuals, insurancecompanies, pension funds, geographical preference	Insurance company, pension funds	Various	Pension funds, geographic preference
Target portfolio allocation	–	–	–	–	–
Conventional Power (eg. coal, co-gen) (%)	–	–	11-20	11-20	51-60
Renewable Power (eg. solar, wind) (%)	–	–	<10	–	–
Transport (eg. roads, airports, ports) (%)	90	61-70	11-20	21-30	21-30
Social (eg. hospitals, schools, jails) (%)	–	<10	<10	21-30	–
Water (%)	–	21-30	11-20	<10	–
Telecom (%)	<5	–	11-20	<10	21-30
Other (%)	<5	–	11-20	21-30	–
Will the fund employ leverage (%)	65-80 - bank loans, securitisation, bonds	No	51-80, bank loans	No	No
Proportion of the return anticipated from financial structuring vs. improvements in operation efficiencies (%)	N/A*	40	50-75	0	40
Minimum ownership stake for minority investments (%)	Less than 10% OK, our deals are very large	31-50	11-30	31-50	Less than 10 OK

* We don't think of it this way - different transactions are different bets - sometimes leverage, sometimes revenue growth, sometimes margin improvement, sometimes all of the above

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asset owners. This presents an opportunity. The business case for the existence of specialist operators may be even stronger in infrastructure than it is in real estate, because by its very nature, infrastructure is an operating asset, with high wear and tear, capex requirements and logistical, operational and managerial challenges that go far beyond operating an office building, for instance. Over the next decade, it appears that there is room in the market for the rise of an equivalent to Trammell Crow or Bovis Lend Lease, but focused on infrastructure and not real estate.

▶Specialisation of the funds, by risk appetite - In addition to specialising in specific sectors and geographies, it also seems likely the industry will learn to specialise in offering higher or lower levels of risk and return, as is now common in real estate and energy infrastructure, where funds define themselves as core, core-plus, value-added, and opportunistic, categories that communicate different levels of uncertainty in the forecasts of cashflows. One might imagine a similar typology for infrastructure: core funds bundling up brownfield assets with histories of stable cashflows; core-plus funds isolating brownfield assets with opportunities for increases in user fees or other revenues; value-plus funds honing in on brownfield assets with possibilities for more active operational improvements; and opportunistic funds betting on greenfield project financings based on imaginative demand forecasts. Such specialisation would go well beyond the simplistic greenfield vs. brownfield distinction that exists in the market today and would allow investors to participate in infrastructure in a more focused format.

▶An infrastructure fund index - As the family of new infrastructure funds mature, locking in project investments and beginning to post returns, it would be useful to develop an infrastructure fund index against which investors could benchmark the aggregate performance of the asset class. As we have seen in other branches of the private equity industry, the creation of an index could be an important step along an evolutionary path that starts with the formation of individual funds and ultimately leads to the establishment of very large funds of funds.

Concluding remarks

Established players will want to continue to monitor the evolution and growth of this start-up industry. For governments, infrastructure funds may represent a significant new source of capital for investment in much needed roads, power plants, schools and hospitals; for project developers, infrastructure funds may provide an attractive source of development capital for greenfield projects and an exit strategy for those wishing to divest of brownfield assets; for financiers, lawyers and contractors, the shift towards private financing of infrastructure could herald a major boom in new project financings and infrastructure construction.

As the private infrastructure fund industry matures, additional research will be necessary to track just how much money is raised, to understand how the funds strategically position and differentiate themselves, and to follow the ultimate performance of the various management teams. The Collaboratory for Research on Global Projects is seeking additional partners to support research along these lines.

It would be useful to develop an infrastructure fund index.

TABLE 8 - FUND OPERATIONS

Fund operation	Fund 1	Fund 2	Fund 3	Fund 4	Fund 5
Professional-educational background of top 3 members of the firm	All advanced degrees	Experienced infrastructure executives with both direct equity and financing backgrounds	Postgraduate degrees	MBA	Educated
Direct employees, not including consultants	30+	9-16	9-16	9-16	9-16
Do you do your own due diligence	Yes	Yes	No	Yes	Yes
Top 3 due diligence consultants in the industry	Usual suspects	N/A	N/A	KPMG, PWC	N/A
Top 3 legal advisors in the industry	Sullivan & Cromwell, Fried Frank	Latham & Watkins, Gibson Dunn, Sherman & Sterling	N/A	Wadia Gandhy, AZB, Desai Diwanjee	N/A
Largest percieved constraints to achieving expected returns	Surplus capital chasing deals, especially in auctions or smaller sized deals	Irrational exuberance from competing funds looking to do a first deal	Excess of money chasing deals thus causing upward pressure on pricing in the market	Entry valuation	Political risks
Other comments	–	–	–	We are a PE fund that invests in infrastructure and are therefore targeting PE returns	–