

Infrastructure market review

An overview of the infrastructure sector in Asia

Date: 11 July 2008

Executive summary

- Since the early 2000's Asia's strong economic performance has contributed to strong global economic growth. Asia's economy has been built upon exports and increasingly larger foreign reserves. This economic model is shared by most nations across the region regardless of their stage of development.
- As Asia's economies grow their demand for infrastructure increases substantially. Demand will remain strong for infrastructure that supports exports and the industrialisation process such as ports, airports and energy generation. As industrialisation creates larger urban populations, demand for water utilities and urban mass transit will also grow rapidly.
- The investment opportunity in infrastructure is not insignificant; with access to both existing and development projects. Investments in the region are oriented towards growth rather than an income yield return profiles. Currently, opportunities exist for unlisted funds to seize on adverse pricing conditions of listed assets.
- Infrastructure investments in Asia are partly hindered by the level of real and perceived risk amongst investors; particularly from political and regulatory uncertainty. Economic risk has diminished as economies grow, diversify and build strategic capital reserves. However, the current slowdown in the US economy is likely to adversely impact economic growth in Asia.
- An investment proposition should consider a portfolio that seizes on the region's strong economic profile but also exploits the diversity across countries. Such a portfolio should be exposed to both developed and developing markets with a focus on export-oriented assets.

1. Introduction

The Asian economic miracle ground to a halt in 1998 with the Asia crisis. It was the culmination of a period of over-investment that had left the region vulnerable to external shocks. Since the crisis many of the economies have re-structured: economic growth is more sustainable and governments have the cash reserves to withstand large external shocks leading to two significant changes in the relative characteristics of Asia's economic performance.

First, Asia's economies are now of sufficient size such that their growth is material to global growth. Despite historically slower expansions in both Europe and the United States, Asia has helped the global economy achieve record growth since 2003.

Second, Asia's domestic economies and its external relationships are now sufficiently diverse to ensure it is better placed to shelter from global shocks to growth, such as the current slowdown in the United States and credit crisis. Regional governments have built significant strategic asset reserves, investment by business has been more cautious, and the markets for Asia's manufacturing exports have expanded beyond the traditional markets of the US and Western Europe.

This favourable economic performance, and subsequently, improving risk profile now makes a study of infrastructure in Asia valuable. Investment opportunities for global investors in Asia are comparable to those (albeit dominated by greenfield opportunities) in the US and Europe.

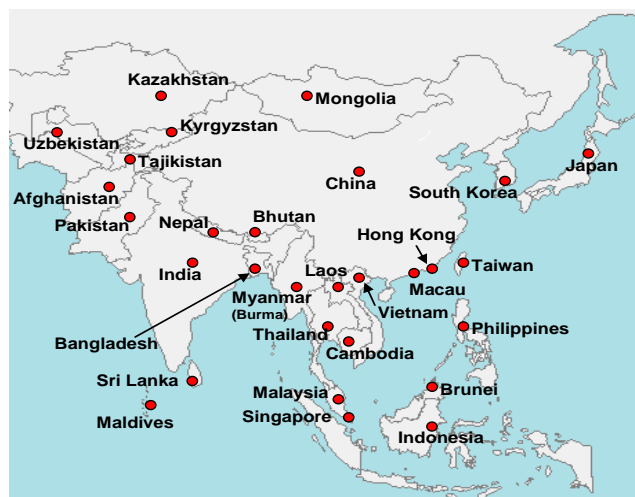
In this report Asia includes the larger economies of East and South Asia with a focus on China, Hong Kong, India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, Thailand and Vietnam. The regional position of these countries is shown in Figure 1.

This report is structured as follows. Section 2 provides an overview of Asia. It considers the macroeconomic background of the region, compares selected key economies and discusses the drivers of infrastructure demand – industrialisation and urbanisation. The overview also considers the capital market

conditions for infrastructure investment and the risks involved in the region. Sections 3 to 7 provide a snapshot of various infrastructure sectors including airports, land transport (roads and rail), ports and energy and water utilities.

Figure: 1

Geographical location of Asian countries



2. Regional overview

The Asia crisis still hovers over Asia. It serves as a warning against euphoric economic expansion. It has coloured external perceptions of the region and leads investors to question the value of Asia as an investment market and the sustainability of the region's growth. This section aims to review these concerns in the context of the macroeconomic environment, the state of capital markets for infrastructure and the risks associated with investment in the region.

The macroeconomic environment

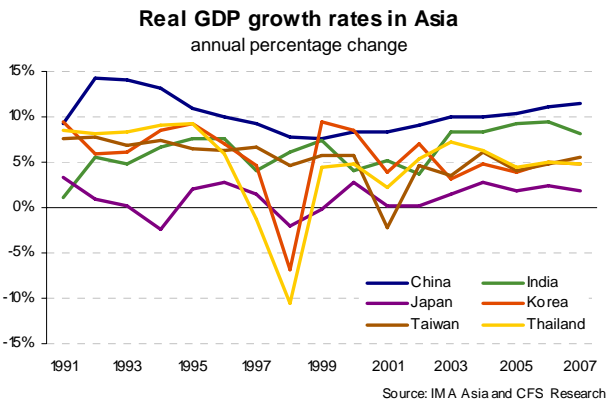
Infrastructure demand is a function of the macro-economic environment; the scale of the economy, its model of development and the sustainability of economic activity. For investors in infrastructure, economic growth is a necessary but not sufficient condition; investors must also see that structural trends of industrialisation and urbanisation are sustainable and permanent. For instance, industrialisation, focused on external trade, has created infrastructure investment in ports, energy and land transport. It has supported increasing urbanisation in the region leading

to further demand for infrastructure in the form of water, urban transport and airports

Economic growth

Asia's record of economic growth since World War II has been unparalleled relative to other regions. The process that began in the North Asian economies of Japan, Korea and Taiwan goes on today in China and South East Asia. Figure 2 shows the rate of real economic growth across a number of Asian economies. Real growth in Asia (ex-Japan) is trending at above 5% per annum. In China and India this is closer to 10%.

Figure: 2



Strong growth, however, is only valuable to investors if it is sustainable and on a sufficient scale to offer a broad range of investment opportunities. This is considered by comparing Asia to the economy of the United States, the world's largest investment market.

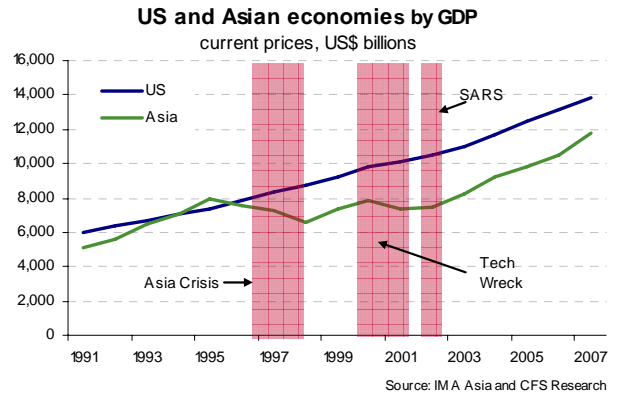
Asia and the US

Comparing Asia and the United States provides some useful context for investors unfamiliar with the structure of Asia's economy. The current size of Asia's economy (US\$11 trillion) remains slightly smaller than the US economy (US\$13 trillion). On current growth rates this gap is likely to close within five years. Figure 3 highlights the current gap of around US\$2 trillion and Asia's faster growth. Indeed, the recent fall in the value of the US dollars enhances Asia's relative size dramatically; reflecting its new found purchasing power in the world market.

Figure 3 also shows the volatility in Asia's growth profile since 1991. While the US

displays a stable growth profile, Asia's growth profile has been far more variable, although more stable since 2000.

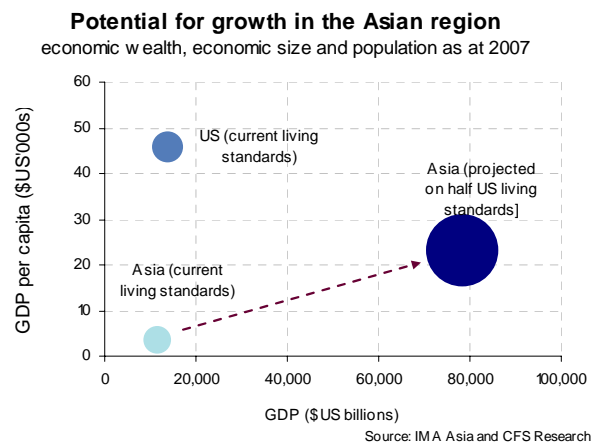
Figure: 3



The single biggest driver of Asia's potential growth is its population. The path to industrialisation and urbanisation that brings people out of a subsistence existence and into a productive market economy raises living standards and increases the size of the economy.

The potential growth in the Asian economy due to rising living standards is highlighted in Figure 4. It shows that if Asia's population enjoyed living standards equivalent to half that currently enjoyed in the US, its economy would expand a further six times.

Figure: 4



The remarkable part of Asia's economic history is that this scenario has been achieved in Japan, Korea, Taiwan, Singapore and Hong Kong. Generally, these successful economies, the Asian Tigers, have followed a similar model of development, focused on trade.

Asia's economic development model

To varying degrees Asia's successful economies have followed an economic development model that is open to foreign trade and investment, is increasingly fiscally disciplined and, to a lesser extent, promotes privatisation and deregulation. The openness to trade and investment helped establish large manufacturing sectors relative to other global markets.

Figure: 5

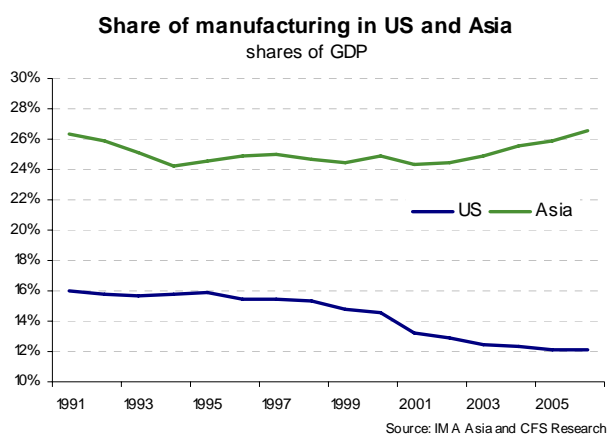
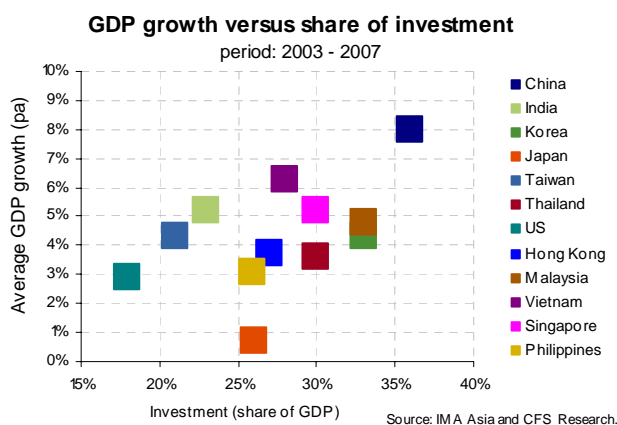


Figure 5 highlights the importance over time of the manufacturing sector to Asia relative to the United States. The diminishing contribution of manufacturing to the US economy emphasises the growing importance of the service sector. In contrast, manufacturing has a growing share of Asia's economy after a period of decline and stagnation from 1991 to 2002. The key driver of this scenario has been changes in price relativities in favour of Asia, in particular China. China's creation of a manufacturing sector sufficiently large to lower global prices has displaced activity elsewhere in the world. It has encouraged complementary manufacturing operations in other Asian economies either further up the value chain (such as in Japan or Korea), or down the value chain (such as in Vietnam or Thailand).

Economic growth in Asia is sustained by the process of recycling surpluses from manufacturing exports into new productive capacity, such as factories and infrastructure. As such, a valuable indicator of future economic growth is an economy's share of investment. Figure 6 shows the compound average GDP growth rates versus the

average share of investment to GDP from 2003 to 2007 for a selection of Asian economies and the US. Clearly, a higher share of investment to GDP is associated with a higher economic growth rate. The chart also comments on capital intensity (the use of capital relative to labour) and productivity (how efficient is deployed capital). For instance, consider Singapore and India (which have similar economic growth but different shares of investment); they have different levels of capital productivity and intensity. Because of India's large and relatively under-employed labour force it has low capital intensity but high capital productivity as for each unit of new capital deployed there are rising marginal returns. For Singapore's small population the situation is reversed.

Figure: 6



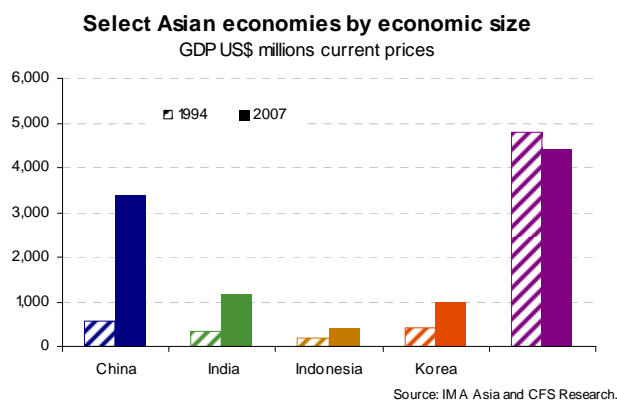
Comparisons within Asia

The different stages of economic development in Asia are highlighted by examining five economies; China, India, Indonesia, Korea and Japan. China and India are population and land mass giants with the potential to be regional superpowers. Indonesia is the most populous country in South East Asia and is one of its least developed. Korea is one of the most developed regional economies, similar in many ways to Taiwan while Japan has can now be considered post-industrialisation.

By size of GDP the five Asian economies are ranked Japan, China, India, Korea and Indonesia. Japan's economy in US dollar terms has indeed shrunk; a reflection of low growth, deflation and currency depreciation. China's growth in the period from 1994 to 2007 has been phenomenal, growing by

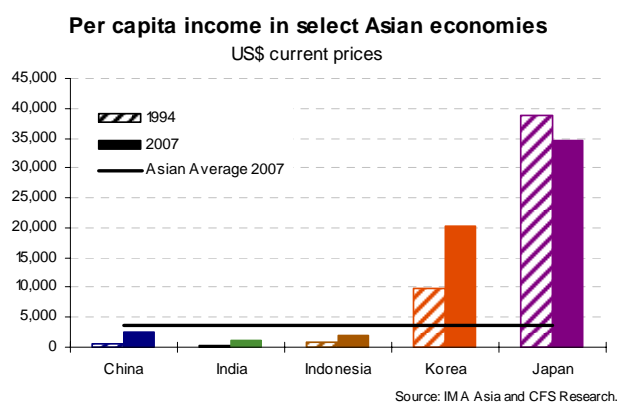
nearly six-fold, compared to nearly four-fold in India and just over double in Indonesia and Korea. India is now a larger economy than Korea. This is shown in Figure 7A.

Figure: 7A



On a per capita basis, Japan's citizens enjoy a substantially better standard of living, though it has shrunk over the observed period. Both Korea and China have enjoyed accelerating per capita income as a result of high economic growth but also relatively slower population growth. China, India and Indonesia all have per capita incomes below the Asian average (for 2007). This is highlighted in Figure 7B.

Figure: 7B

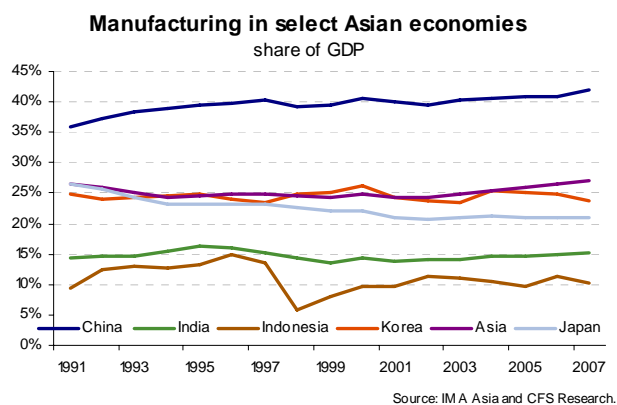


The divergence in per capita income and GDP growth rates across Asia is largely due to the role played by trade and investment in each economy. Successive studies of Asian growth patterns show that these two factors can explain nearly all of a country's growth. Successful Asian economies have grown by shifting resources from agricultural production to manufacturing exports. For labour in particular, a shift to manufacturing creates stronger wage growth. As exports grow,

investment and the level of sustainable economic growth will also rise. Support of trade by governments is essential to this process. While Korea and, more recently, China have opened up to trade, India and Indonesia have suffered from limited government support for trade. In particular, India's policy of self-sufficiency, supported by a planning commission or 'licence Raj' that imposed high barriers to trade, has constrained growth.

An important aspect to economic development is the role of the manufacturing sector. The strength of manufacturing is a combination of openness to trade and high levels of investment. As shown in Figure 8 even in the most developed economies, such as Korea, Japan and Singapore the manufacturing sector remains an important contributor to growth; representing at least 20% of GDP compared to 12% in the United States.

Figure: 8



Over time the role manufacturing in China is expected to moderate towards the average for Asia. This will occur as manufacturing is displaced to lower cost destinations and the domestic economy rises in importance relative to the export sector. The under-performance in India and Indonesia can be explained by the small manufacturing and large agricultural sectors. For example, in India approximately 80% of the population lives in rural areas.

The decline of Japan is evident in this analysis. The period of stagnation and decline since 1989 suggests that Japan has largely come to the end of the industrialisation and urbanisation process. As such, investment in new infrastructure is likely to be substantially lower than elsewhere in Asia. Furthermore the difficulties of foreign investment in Japan,

particularly in infrastructure such as utilities, make it an unattractive destination for capital.

Industrialisation and urbanisation

The two structural drivers of infrastructure demand are industrialisation and urbanisation. These factors have been accelerated by economic growth across the region. Industrialisation creates rising incomes and encourages urbanisation. A virtuous circle of rising economic growth develops that is capable of ending poverty and increasing economic activity to developed world levels.

Industrialisation requires investment in infrastructure. Manufacturing exports are energy intensive, particularly as a shift occurs up the value chain to heavy industry. They also require transport infrastructure (including ports and land networks) as goods commence the journey from factory to their final destination. In Asia the final destination is generally offshore.

The extent to which Asia has created the infrastructure for industrialisation can be gauged by the World Bank Competitiveness Index. The competitiveness scores for infrastructure are designed to make relative comparisons of infrastructure across countries. The score gives particular weight to business infrastructure such as energy, telecommunications and transport. The scores for principal Asian nations are presented in Figure 9. The scores suggest that within Asia, Hong Kong, Singapore and Japan have the most developed infrastructure. Furthermore, the scores highlight the diversity of infrastructure across developed and developing Asian countries. The original Asian Tigers of North Asia have substantially more developed infrastructure relative to the countries of South East Asia.

Urbanisation that occurs on the back of industrialisation creates more efficient economies by agglomerating economic activity in a smaller space. But it also places increased stress on infrastructure. There is greater demand for energy, water and waste management. This creates congestion, and so, increases demand for roads, particularly expressways, and mass transit rail systems. As urban areas become more important,

growth in air transport supports demand for airports.

Figure: 9

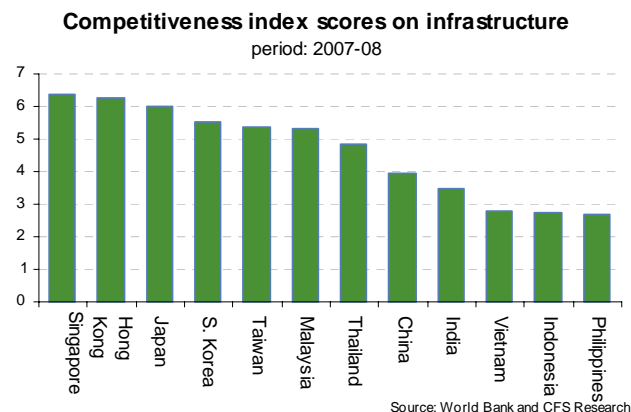
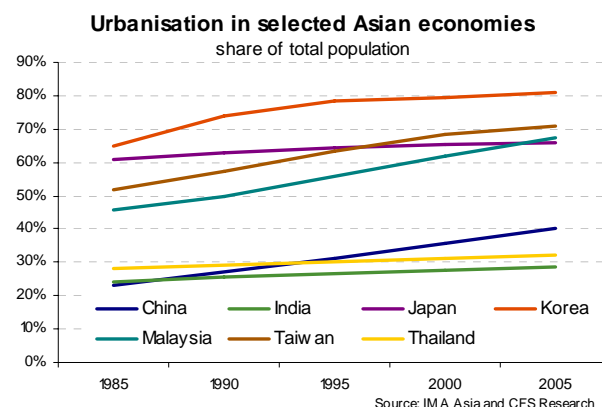


Figure 10 shows trends in urbanisation rates across selected Asian countries. Notably, as with economic growth, urbanisation rates across countries are not uniform. Furthermore, economies are clustered by stages of development; the bottom three countries in terms of urbanisation rates have significantly lower GDP per capita than the top four countries. For example, Thailand (having the highest GDP per capita amongst the low urbanisation countries) has annual per capita income of US\$3,300 compared to US\$6,100 in Malaysia, the lowest amongst countries with high urbanisation rates. The speed of China's industrialisation is contributing to a rate of urbanisation significantly greater than in India and Thailand.

Figure: 10



Economic growth versus risk

The previous sub-sections highlight the homogeneity of the Asian region in its economic growth model and the range of opportunities in the region due to the diversity

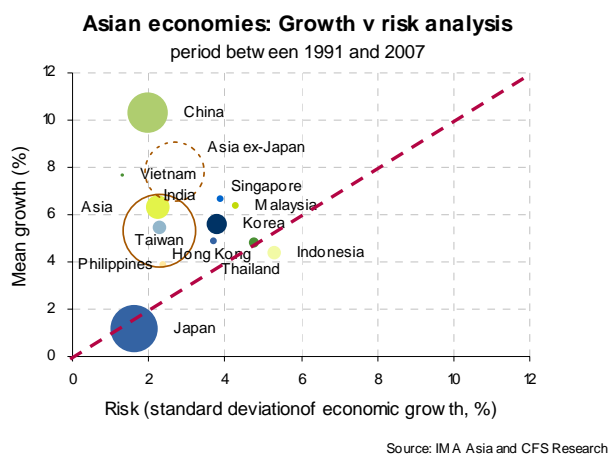
of markets. In highlighting these two themes we consider the trade-off between economic growth and risk.

The success Asian countries have had in producing strong growth with relatively lower volatility is the strand that holds the region together. The economic development model, focused on the external sector, drives the two structural themes behind infrastructure development; industrialisation and urbanisation. This theme is considered appealing to long-term investors for infrastructure investments.

Figure 11 shows a risk-reward trade-off of economic performance across Asian countries and regions over the period between 1991 and 2007. Note that the size of each bubble reflects the economic size (in current US\$) of the respective economies.

Most of Asia's economies are clustered above the red line reflecting a position of strong economic growth with relatively low volatility, despite the impact of the successive crises between 1998 and 2003. Those most affected by these crises, South East Asia, Hong Kong and Korea, are clustered slightly to the right, but, apart from Indonesia and Thailand, remain above the diagonal dotted line. The largest exception is Japan whose economic growth profile no longer matches the high growth profile of the rest of Asia.

Figure: 11



Capital market conditions

The need for infrastructure in Asia is rising based on large and fast growing economies transitioning through different stages of

industrialisation and urbanisation. But this requires the mobilisation of capital. The conditions for this to occur are improving. There are strong capital flows from high savings. There is a growing range of products and asset pricing (relative to more developed markets) remains attractive. These drivers are discussed in this section.

Capital sources

A crucial problem for infrastructure creation will be the source of funding and the role the private sector can play as a source of capital. In many economies domestic public funding is possible because of large cash reserves available for more productive investment. Asian governments and central banks now hold an estimated US\$3 trillion (tn) in reserve funds. The Chinese government's reserves total US\$1.4tn. Other large sources of capital include US\$3.6tn of Japanese postal savings that will be more actively managed upon privatisation of Japan Post in 2009.

Funding is more difficult in other markets, particularly those that are least developed such as Indonesia, India and the Philippines where governments are constrained by high public debt despite a large pipeline of work already identified. Often in these economies external private funding will also be less forthcoming. External capital will often have negative perceptions of the risk-reward trade-off associated with developing markets. Internal finance is constrained by the inability of the household sector to create savings because of high dependency ratios (the ratio of the working age population to the non-working age population) that limit the potential for increased surpluses from labour income.

The surplus of public funds does not preclude private finance playing a role in funding the infrastructure gap. The role private investment can play in providing infrastructure is important. First, it is often more likely to create an efficient outcome for the delivery of infrastructure projects. Privatising the process can foster innovation, increase value for money in public sector procurement, increase competition and promote transparency, particularly the Public Private Partnership (PPP) approach. Second is the imperative of

developing a private pension and health insurance industry in Asia. Without a public or private social safety net in much of Asia, the household sector generates its own precautionary savings. This has acted as an impediment to the growth of a more robust domestic sector. The development of securitised infrastructure as an asset class would aid the creation of deeper and broader capital markets in Asia.

The sources of capital available to Asian infrastructure will generally be quite broad and will include pension funds, investment banks and sovereign wealth funds (SWF). Recent entrants include Morgan Stanley who raised US\$4bn for its Asian infrastructure fund and Global Infrastructure Partners have raised US\$5.6bn and will focus on opportunities in Asia. The SWFs represent a new source of capital for the region. As governments in Asia and the Middle East diversify their reserves away from US treasuries infrastructure will benefit significantly particularly as these funds already have strong links to the region.

Investment products

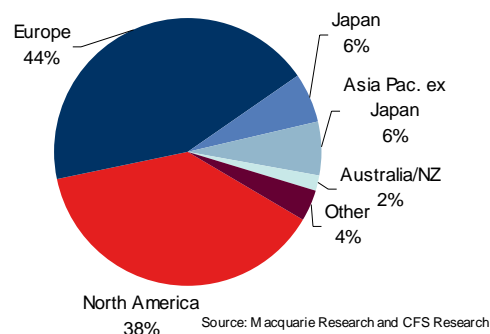
Currently, opportunities for private investment in Asia are the listed companies, investment funds and Greenfield projects.

Listed companies

The listed market for utilities and infrastructure assets in Asia is small relative to other regions, including Europe and North America. Figure 12 shows the market capitalisation of companies in the sector by region according to Macquarie Research. Notably, while Asia represents about 12% of the index, the composition of companies in Europe and North America is heavily weighted towards utilities. In contrast, Asian listed infrastructure companies in Merrill Lynch's infrastructure research amount to 36% of its global coverage by market capitalisation. Some of the large listed Asian infrastructure companies include Japan Rail, Daqin Rail and Beijing Capital Airport.

Figure: 12

Listed infrastructure and utilities by region
shares based on market cap as at 30 June 2008



Investment funds – listed and direct

The listed and unlisted funds approach has been led by Macquarie Bank. Macquarie listed the Macquarie International Infrastructure Fund in Singapore. It holds Asian assets including the Changshu Xingua port in China, Taiwan Broadband Communications and Hua Nan Expressway. Macquarie's Korean infrastructure funds holds stakes in the Seoul Subway, the Incheon Grand Bridge and three new expressways. It is dual listed in London and Seoul. All the assets in this fund are currently under construction.

Other players in the Asian infrastructure investment space include Hon Leong Infrastructure fund based in Malaysia, Prudential with \$450m in funds, the Vietnam Infrastructure Fund, a closed end fund with \$402m in cash and Cityspring Infrastructure, a Singapore listed infrastructure fund using a REIT (Real Estate Investment Trust) type structure and valued at \$455 m at IPO in 2007.

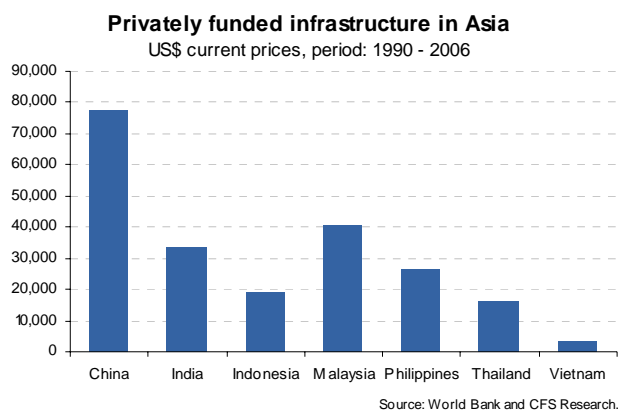
Greenfield developments

For some time OECD markets have been developing the regulatory frameworks, such as the Public Private Partnership (PPP), for the deliver of infrastructure products. In Asia such legislation exists in only a handful of Asian markets, including Korea, Malaysia and the Philippines. These markets have developed PPP or Build-Own-Transfer (BOT) models for private development of infrastructure with Korea being most successful, creating US\$36m of projects. In

Indonesia the government has established a take or pay system for the development of energy assets. A take or pay agreement is a contractual arrangement where one party agrees to purchase a specific amount of another party's goods or services, regardless of whether the purchasing party still needs the services. This provides infrastructure investors with the necessary contractual certainty for future cash flows to commit to large upfront capital projects.

Figure 13 shows private participation in infrastructure projects in the developing countries of East Asia and India from 1990 to 2006 sourced from the World Bank's database. China has attracted the most capital for infrastructure projects, over US\$75bn for a total of 416 projects. The most successful country for attracting private funding on a per capita basis is Malaysia (being US\$704). The Philippines and Thailand have also attracted more capital than the regional average. This highlights the attractiveness of the right regulatory framework; each of these countries has adopted some form of PPP.

Figure: 13



The following data quantifies the scale of the likely increase in spending on infrastructure due to industrialisation and urbanisation over the next ten years. The Asian Development Bank (ADB) estimates total spending on infrastructure of US\$3 trillion over the next ten years. In many countries the planning is already in place. India estimates expenditure of US\$350 billion (bn) to 2012, including US\$130bn in the energy sector. China has expenditure plans of US\$100bn over the next ten years in each of the following sectors: rail, roads, airports, energy and water. Other plans

to 2010 include US\$9bn on transport projects in Singapore, US\$47bn on general infrastructure in the Philippines, US\$66bn on development plans in Malaysia and US\$53bn on utilities and roads in Thailand.

Pricing considerations

In the short term, as equity valuations fall globally, yields are rising in the listed infrastructure sector to the extent that equities have prices below NAV. This is a constraint on new listings both globally and in Asia. Instead, the current focus is on direct unlisted funds where there has been no evidence to date of asset values falling. Unlisted vehicles also have the ability to be more flexible in the type of deals they take on and the ability to raise capital. The opportunity for unlisted funds is to purchase listed vehicles to take advantage of the relatively low value of listed stocks, de-list them and remove the risk of future volatility.

In the medium term listed yields will fall towards the levels prior to the credit crisis driven by the weight of capital looking for infrastructure opportunities in the region balanced by an improved flow of product on to the market. Variations amongst yields will be dependent upon the perceived risk, especially risks associated with cash flow, regulatory regimes, political environments and individual economies.

Risks

The path of Asia developing infrastructure to advanced economy standards will entail significant risk, both perceived and real. Key areas of risk for infrastructure investment include: economic risk, sovereign risk, regulatory risk and political risk. Each of these is briefly discussed in turn.

Economic risk

Asia's economic growth has been historically volatile. The volatility in Asia's real economic growth relative to the US was three times greater between 1991 and 2007. This mainly reflected the impact of the Asian crisis on many of the region's economies, including Thailand, Malaysia, Korea and Indonesia. It created a fall in economic activity and political

instability. As an example Thailand's GDP fell from Bt3.12tn in 1996 to a low of Bt2.75tn in 1998 and did not recover to 1996 levels until 2002. This deep recession lowered demand for key infrastructure assets and made debt financing of assets more difficult.

More recently, the slowdown in the US economy, coupled with the on-going fallout of the global credit crisis is likely to adversely impact economic growth in the Asia region.

Apart from economic risks that impact the region, countries face country specific risk. Korea and Taiwan have experienced downturns this decade because of credit crunches created by over-indebtedness amongst households using credit cards. Japan is struggling to adapt to an ageing and shrinking labour force while constraints on investment in Malaysia have handicapped growth in the region.

Regulatory risk

As mentioned earlier, regulatory frameworks in Asia are well developed. The markets with the most developed frameworks for greenfield projects are Korea, the Philippines and Malaysia. However, even the most developed market, Korea, has probably not seen sufficient deal flow (only US\$36m in 10 years) for the system to be completely robust.

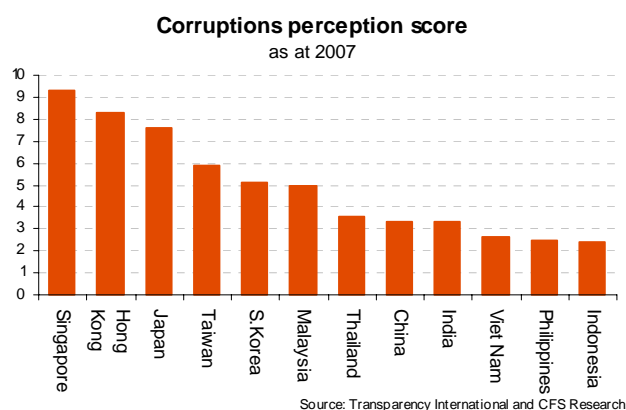
Even so, private investment has been successful according to the World Bank database. In the period between 1990 and 2006 1,253 projects have been completed at a total cost of US\$216bn. Project cancellations over the period amount to 43 or 3.4% of all projects.

According to the World Bank, India has a clean record, although there are also numerous examples of projects in the sector that have failed. As an example, the Dabhol Power project in India, built by Enron Energy in the 1990's, was shut down for five years because the negotiated terms had become uneconomical. For other countries, China stands out as the largest user of private supply, although with higher cancellation risk. Malaysia is the second largest user of private supply by project value and has a low cancellation rate. This may reflect the

confidence of investors in the regulatory framework.

Transparency International has created a measure of transparency in global markets. Figure 14 shows the scores (from zero to ten) for the corruption perception index for selected Asian countries. The higher the score the more transparent markets are in this country relative to others. Indonesia has the least transparent market in the region while Singapore with a score of 9.4 is the most transparent.

Figure: 14



Political risk

The political risk associated with Asia has traditionally been considerable. Of the countries in this study four are effectively one-party states, while few of the remaining democracies have enjoyed stability. Indeed the non-democracies have been more successful economically than the democracies.

The cost of political instability for foreign investors was most recently observed in Thailand. The coup of 2006 led to significant changes for foreign business particularly asset ownership. Foreign investors may no longer hold majority control of Thai assets including residential property and businesses.

Overtime the development of democracies in the region will improve the institutional framework. However the history of Asia has shown that enhanced democracy will often lead to slower and less effective decision making. Examples of where this has occurred include Japan, Korea and India.

Sovereign risk

Sovereign credit ratings are a proxy for sovereign risk, and encompass factors such as transparency in policy decisions, fiscal and monetary flexibility, government debt burden and the market-orientation of the economy. As such, they provide a useful guide to the level of investment risk for a particular country.

Table 1 shows the current long-term sovereign credit rating for twelve countries. Generally the more developed markets have higher sovereign ratings than emerging markets. However Japan, Taiwan and Korea stand out as developed markets with low ratings. This is due to high public debt levels in Japan, the cross-Straits relations with China in Taiwan and a history of financial crisis in Korea.

Table: 1

Sovereign credit ratings	
Selected Asian Countries 2007	
rating	country
AAA	Singapore
AA+	
AA	Hong Kong, Japan
AA-	Taiwan
A+	
A	China, Korea
A-	Malaysia
BBB+	Thailand
BBB	
BBB-	India
BB+	
BB	Vietnam
BB-	Indonesia, Philippines

Source: Standard and Poors and CFS Research.

3. Airport sector

In many ways the impact of air transport on developing economies is similar to the impact of mobile telephony. Mobile communication allows developing countries to by-pass the building of fixed line networks. Similarly, air transport networks provide developing countries with the ability to establish transport links between urban areas without the expense of roads and rail.

Air transport in Asia is set for extraordinary growth over the next twenty years. According to data from the Airports Council International (ACI), by 2025 Asia will be the global leader in passenger numbers, from its current third position behind Europe and North America.

The recent growth in air traffic in Asia is highlighted in Figure 15 which shows passenger growth across selected Asian markets. Total passenger numbers increased to 967 million in 2006 from 723 million in 2003; representing a compound annual growth rate (CAGR) of 8% for the region. The passenger growth observed in Asia is strongest in the emerging markets of China and India. Between 2003 and 2006 India and China both grew at CAGR of 19% and it is likely that in 2007 total passengers in China eclipsed total passengers in Japan. The slowest growth, 2% per annum, was observed in Japan and South Korea, highlighting the maturity of these markets.

Figure: 15



Key drivers

The key drivers of the sector are expected to include little competition from alternatives (such as road and rail), regulatory developments, and income growth and

urbanisation. These will encourage growth in intra-region travel as outlined below.

Little competition from alternatives

Asia's land mass, political boundaries and lack of other significant transport infrastructure creates a number of barriers for road and rail. For Japan, Korea, Taiwan, Indonesia and the Philippines non-air international travel is nearly impossible. For the remaining countries in Asia international travel by means other than air is more common but similarly difficult as a result of political, geographic or infrastructure constraints. Domestically, air travel is also competitive in a number of countries such as Japan, China, Indonesia and India due to the distances involved and the inefficiency of alternatives.

Regulatory changes

A key issue for Asian passenger growth will be regulatory changes to promote intra-regional air travel. Across Asia there are moves to install open sky agreements that liberalise air travel between countries and regions. ASEAN (Association of South East Asian Nations) has agreed on the establishment of such an agreement by 2015. The agreement would cover 24 principal airports in the region and bring greater competition. The ASEAN agreement would initially liberalise air freight and increase air travel competition in the Brunei, Malaysia Indonesia and Philippines sub-region and the Vietnam, Cambodia, Laos and Myanmar sub-region before covering the entire region.

Japan is leading a push for greater liberalisation, through an open sky structure, in North Asia. There are plans to open up a number of regional airports, including Tokyo's large domestic airport Haneda (the region's largest airport by passenger) to international flights to capture demand from the growing leisure travel markets in Korea and China.

Income growth and urbanisation

The impact of income growth and urbanisation will create stronger demand for air travel in Asia. Moreover, the process of urbanisation will create a number of different groups of air

passengers. It will increase internal business and leisure travel, intra-regional business and leisure travel and hub traffic.

Within the large land mass Asian countries such as China and India, and the archipelago nations such as Indonesia, the Philippines and Malaysia, air travel will come to dominate the inter-city travel market as incomes rise. Urbanisation will mean large sections of the population move away from their traditional areas to the larger cities and make return trips to visit family.

Intra-regional travel is likely to be focused on the large business centre markets of Singapore, Hong Kong, Shanghai/Beijing and Tokyo and holiday markets, particularly in South East Asia.

Finally, some of Asia's airports will benefit from increased hub traffic as globalisation acts as a further spur to inter-continental travel. The long distances between Asia and other continents make hub-and-spoke operations the most efficient means of inter-continental travel. The dominant hubs in the region include Singapore, Bangkok, Hong Kong and Tokyo.

Other issues

This section identifies the largest airports in Asia, the expected growth in China and India and the private participation in airport developments across developing Asia.

Key airports

The largest airport assets in Asia are generally the key hub airports of Hong Kong, Beijing, Singapore, Tokyo and Bangkok. Each of these airports had total passengers above 35 million per annum. The largest airport in the region, Haneda, saw 65 million passengers in 2006 despite its domestic-only status.

The EU recently decided, arbitrarily, that an airport is sufficiently large to impact the market if it has at least 5 million passenger movements per annum. It is worth noting that Asia has 41 airports that meet this criterion. According to ACI 11 of these airports are in Hong Kong/China, 9 in Japan and 6 in India.

China

China has plans to build as many as 97 new airports by 2020 at a cost of \$64bn such that over 80% of its population live within 100 kms of an airport.

The challenge for China is creating this capacity fast enough. The extent of over-utilisation is such that administrative restrictions have been placed on growth including a ban on new airlines until 2010; not allowing airlines to buy additional new planes or open new routes without the necessary pilots as well as bans on pilots flying overtime. Airports that were operating above capacity in 2007 include Shanghai Hongqiao, Chengdu, Shenzhen, Dalian, and Beijing Capital International.

Since 2005 private capital, including Hong Kong International Airport, Changi Airport International (CAI) and Fraport, have played a role in the Chinese airport sector. Issues for foreign investors are a cap of 49% ownership and a limit of thirty years for an airport JV. The three key challenges for foreign investment are the need for considerable business acumen and patience, the limited supply of appropriately skilled people (such as air traffic controllers and pilots) and a scarcity of investment grade projects. China trains about 600 pilots annually but needs twice that many to keep up with demand, according to analysis by the Beijing University of Aeronautics and Astronautics.

India

India also has significant plans. Recently a new airport has opened at Hyderabad and a new one will open at Bangalore in 2008 with other greenfield opportunities in resort locations and emerging metro areas. Delhi and Mumbai airports are to be privatised to stimulate the considerable investment required. On completion of this process Kolkata and Chennai airports are also likely to be privatised. Finally 35 non-metro airports will be re-developed using US\$9bn of government funds. India is keen to attract Foreign Direct Investment its airport sector; Indian law allows for 100% foreign ownership of both existing and greenfield airports. As in China, India is constrained by resources. It requires 450

pilots immediately and will need 4,500 more over the next five years, according to the Centre for Asia Pacific Aviation.

Private funding of airport developments

Table 2 outlines private airport projects across selected Asian countries. The table shows China, followed by India, has been most successful in attracting private capital into the airport sector. One project, the development of Manila Airport in the Philippines, was subsequently cancelled.

Table: 2

Private airport projects in Asia		
period: 1990- 2006		
Country	Number	Value (US\$ million)
China	15	2,448
India	6	3,386
Indonesia	0	0
Malaysia	2	411
Philippines	1	520
Thailand	2	455
Vietnam	1	15
Combined	27	7,235

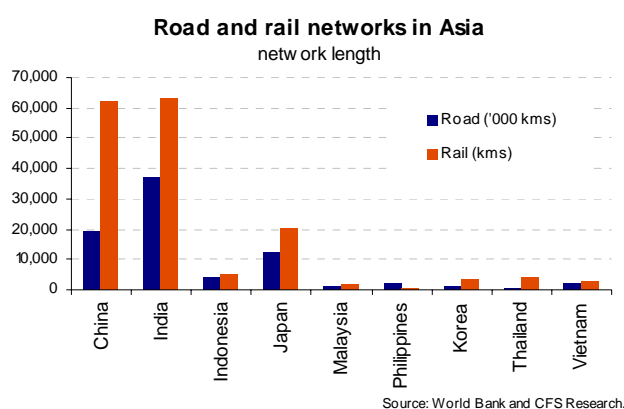
Source: World Bank and CFS Research.

4. Land transport sector: roads and rail

Land transport infrastructure, both road and rail, is expected to see substantial growth over the next decade. The drivers of this infrastructure development will be intra-regional integration, particularly for freight, and urban congestion. The constraints on intra-regional infrastructure development remain political and geographical.

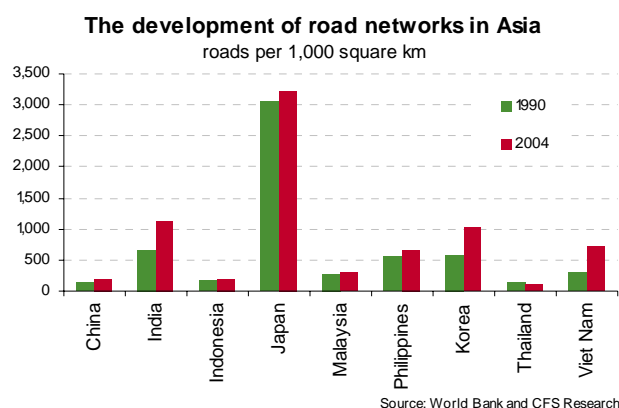
Figures 16A and 16B highlight the size of the land transport sector in Asia. Figure 16A shows the total kilometres of roads and railways in the major Asian economies. The rail networks in China and Thailand are relatively very large (against their road networks) and, as such, are important strategic assets. China's railways are the busiest and most efficient in the world; hauling 24% of the world's freight on 6% of the world's tracks. This creates greater land transport efficiency by taking trucks off the road and so improving congestion. Rail is also more energy efficient.

Figure: 16A



A measure of road development in Asia is roads per 1,000 square km of land mass as shown in Figure 16B. The diversity in road networks across Asian countries is due to variations in: stages of development; the legacy of colonial rulers, and a reliance on rail rather than road infrastructure as seen in China and Thailand.

Figure: 16B



Key drivers

The key drivers for land transport, intra-regional integration and urban congestion, are outlined below. Intra-regional integration will drive higher trade while urban congestion is focused on public transport.

Intra-regional integration

Enhanced intra-regional development is important for Asia particularly to develop trade. The creation of trade corridors should develop economies lying at the crossroads between the industrial giants of North Asia and the emerging economies of South East Asia and South Asia, particularly India.

Strategically, the important intra-regional corridors are north-south and east-west. The north-south corridor runs from China's population centres in the North East to South East Asia through the Laos and Thailand to Malaysia, Singapore and Indonesia. The east-west corridor links China with economic and population growth centres in India and the Middle East; mirroring the ancient Silk Route.

The Asian Development Bank has taken the lead role in developing these trade corridors by championing the Asian highway network. It is modernising the region's road transport system through a 35,000 km network that commenced in 2004. The project, run by the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP), was first launched in 1959, but suspension of funding in 1975 and political obstacles halted progress.

The project involves upgrading networks around Asia, linking capital cities with ports,

airports, tourist areas and other commercial centres. It extends as far as Western Asia, connecting with Europe and the Middle East. China, India and Thailand account for three-quarters of the network that passes through twelve Asian nations. The ADB has already invested a total of US\$26bn in improvement and upgrading works, in conjunction with other funding agents in the Asian Highway programme. It is now looking for a further US\$18bn that may come from private funding.

Urban congestion

Urban congestion creates demand for efficient infrastructure solutions. Asia’s cities are the most populous in the world making up 28 of the top 50 cities by population and 44 of the top 100 cities in the world in 2006. Table 3 shows the top 20 cities in the world by population.

Table: 3

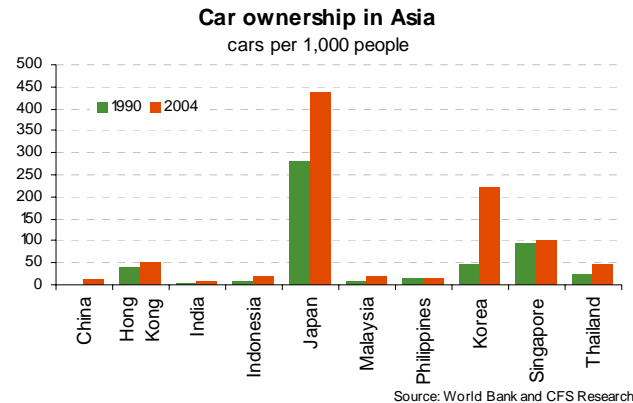
Top 20 world cities by population as at 2006			
City	Country	Region	Population (millions)
Tokyo	Japan	Asia	28.0
Mexico City	Mexico	North America	18.1
Mumbai	India	Asia	18.0
Sao Paulo	Brazil	South America	17.7
New York	US	North America	16.6
Shanghai	China	Asia	14.2
Lagos	Nigeria	Africa	13.5
Los Angeles	US	North America	13.1
Calcutta	India	Asia	12.9
Buenos Aires	Argentina	South America	12.4
Seoul	South Korea	Asia	12.2
Beijing	China	Asia	12.0
Karachi	Pakistan	Asia	11.8
Delhi	India	Asia	11.7
Dhaka	Bangladesh	Asia	11.0
Manila	The Philippines	Asia	10.8
Cairo	Egypt	Africa	10.8
Osaka	Japan	Asia	10.6
Rio de Janeiro	Brazil	South America	10.6
Tianjin	China	Asia	10.2

Source: UNDP and CFS Research.

In addition to population, urban congestion rises with the number of cars. The significant rise in income in Asia has contributed to growth in car ownership as seen in Figure 17. Korea experienced the greatest absolute gain in car ownership across Asia. From 1990 to 2004 car ownership in Korea rose from 48 cars per 1,000 people to 223 cars per 1,000. In proportionate terms car ownership rose

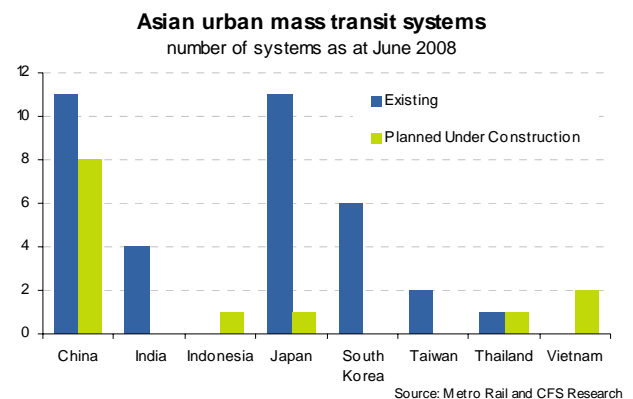
from 1 car per 1,000 to 13 cars per 1,000 in the same period in China.

Figure: 17



Urbanisation and car ownership is driving demand for congestion solutions such as toll roads and urban mass transit systems. Figure 18 shows the number of existing and planned urban mass transit systems. There are currently 38 urban mass transit systems in Asia with 12 planned or under construction; eight of these are in China. The planning for further urban mass transit programmes highlights the political pressure that governments face to relieve urban congestion. In cities such as Bangkok where congestion materially impacts economic and social life, urban transit is a key election issue.

Figure: 18



Projects

The responsibility for road and rail development generally falls on individual countries. In the last ten years China’s road network has expanded by 770,000km of road. The current five year plan includes a further 1.2 million km to be built between 2006 and 2010. China is building 5,500km of motorway per year with expressways reaching 70,000km

by 2010. China's railways will increase from 64,000km in 2004 to 120,000km by 2020 at a likely cost of US\$190bn pa.

Malaysia has six development projects including a light rail for Kuala Lumpur and a high speed link between Kuala Lumpur and Singapore. Indonesia has committed US\$150bn to infrastructure including US\$23.4bn to construct 114,000km of roads. Table 4 shows that China, followed by Malaysia, has been most successful in attracting private capital to the sector.

Table: 4

Private rail and road projects		
period: 1990 - 2006		
Country	Number	Value (US\$ million)
China	129	25,135
Indonesia	23	3,335
Malaysia	36	13,407
Philippines	4	1,509
Thailand	4	2,922
Combined	196	46,308

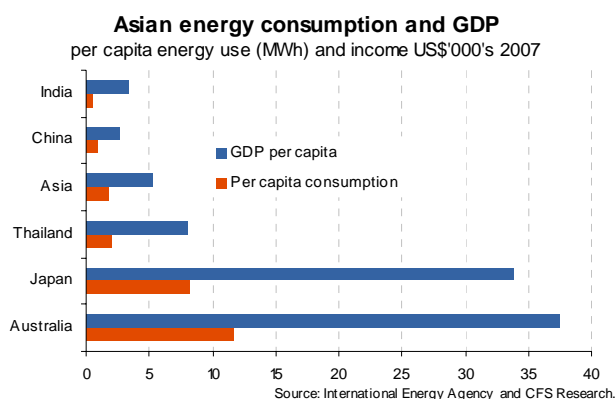
Source: World Bank and CFS Research.

5. Energy sector

Growth in demand for energy in Asia is primarily driven by economic growth and urbanisation. The potential in demand growth for energy is enormous.

Figure 19 shows the consumption of energy and also per capita income by country in Asia. Notably, energy consumption is highest in the developed markets of North Asia where economic growth and urbanisation is strongest. As urbanisation and incomes converge across the region per capita energy consumption in Asia, which is currently 1.8 megawatt hours (MWh) per annum, will also rise towards per annum consumption levels experienced in Japan.

Figure: 19



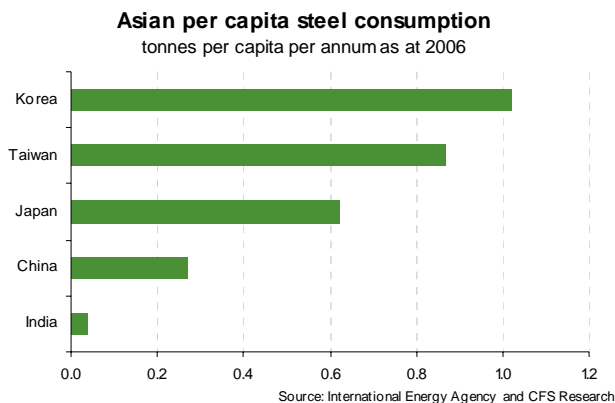
Key drivers

The growth in energy intensive production will be a significant driver of energy demand in Asia; particularly relative to the rest of the world. The process of Asia's economic development has been similar across countries. From largely agrarian economies, Asian countries have moved into light manufacturing, then heavy industry and in some markets created service dominated economies, particularly Hong Kong and Singapore.

The consumption of steel helps to quantify the level of growth in energy intensive production that is likely to occur in Asian markets over the next generation. Figure 20 shows current consumption of steel in tonnes per capita as at 2006 in a selection of Asian markets. The chart shows that per capita steel consumption in China and India lags steel consumption in

Korea, Taiwan and Japan. Steel used in the developed Asian markets will be used in goods for domestic and external consumption, in exports such as cars, ships and in heavy engineering construction.

Figure: 20



Over time China's consumption of steel per capita will approach current consumption levels in Korea and Japan. This will reflect two trends displacement of heavy industry from these markets to China and rising per capita income. China's per capita consumption of 0.28 tonnes per annum remains below consumption in the most developed parts of the world where annual consumption is closer to 0.5 tonnes per annum. A similar scenario is likely to emerge in India.

Other issues

Asia's energy sources

Increasing Asian demand for energy over the next fifteen years will likely be the simplest and cheapest option, coal as well as natural gas and increasingly nuclear. The greenest alternatives, renewables, do play an important role in Asia. However, additional renewable capacity will be expensive to develop for most Asian economies.

Coal generation

Table 5 shows that total demand for new coal-generated energy in the major markets of East Asia at around 6% per annum on a CAGR basis, according to UBS estimates. This will nearly triple the current output of coal-fired generation capacity in Asia. Those countries with high coal fired generation growth are also the ones with current lowest levels of

generation. Power generation in the five least urbanised markets (Vietnam, India, Thailand, China and Indonesia) will increase from 563 gig watts (GW) to 1,420GW by 2020. This is a CAGR of 6.4%. With growth in energy demand driven by increasing industrialisation it can be expected that investment opportunities in power generation in Asia will be large.

Table: 5

Country	Coal Fired Generation Capacity (GW)		CAGR (%)	Urbanisation
	2006	2020		
Vietnam	2	8	10%	27%
India	71	180	7%	29%
Thailand	1	8	16%	33%
China	481	1,180	7%	41%
Indonesia	7	44	14%	49%
Malaysia	4	7	4%	68%
Philippines	4	6	3%	63%
Japan	38	36	0%	66%
Taiwan	12	24	5%	58%
Korea	18	27	3%	81%
Hong Kong	7	7	0%	100%
Australia	38	43	1%	88%
New Zealand	1	0	0%	86%
Total	684	1,570	6.1%	61%

Source: UBS and CFS Research

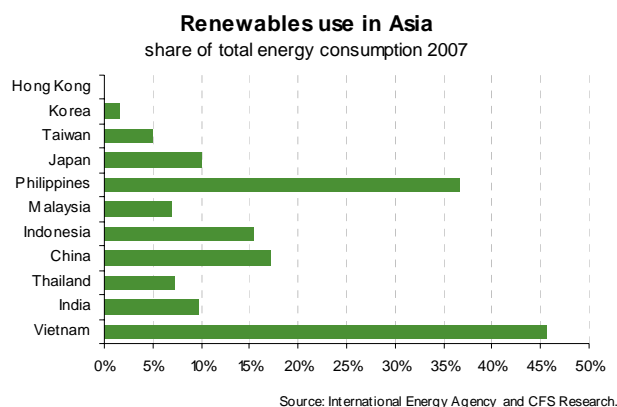
Renewables

The greener alternative to electricity generation is renewables such as hydro-electricity, alternative fuels and wind power.

Figure 21 shows renewables production by market. Notably, the Philippines, Vietnam and China all have very high proportions of renewable energy primarily due to the availability of hydropower. No other source of renewable energy made up more than 10% of total energy consumption in any country. Over time the Philippines and Vietnam will struggle to maintain these high percentages as energy consumption grows faster than installed hydro capacity. Indeed renewables are unlikely to play a significant role in energy generation in emerging Asian markets over the next fifteen years unless their price efficiency begins to match that of coal.

The development of new energy assets in Asia is likely to be driven by private sector funding and management. Private sector energy operators are prominent in all energy markets in Asia, including the least developed such as Cambodia and the Lao People's Democratic Republic.

Figure: 21



However the type of private sector investor in Asia seems to be changing over time. A study by Public Services International, a UK based research company, outlined the investment opportunity in Asia for international investors. The study showed that international energy generators are largely abandoning investments in Asia. The study showed that ten companies have exited Asian operations, between 1999 and 2004, while those remaining have generally scaled back operations and are focused on the better regulated markets. International multinationals are involved in China, India, Vietnam, Thailand, the Philippines, Singapore, Australia and Malaysia.

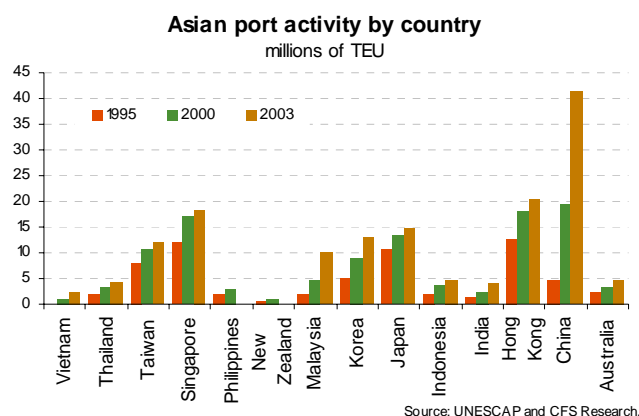
China, followed by India, has been most successful in attracting private capital to the sector. Indonesia has the highest cancellation rate. The majority of projects available have been greenfield where the investor must assume the associated development risk.

6. Ports sector

Ports are an important part of a nation's economic network, providing an entry and exit point for large proportion of sea-based international trade. With trade as a central part of the economic development strategies of Asian economies, ports are likely to see continued growth in traffic; constrained only by the supply of appropriate physical locations.

Figure 22 shows port throughput in the largest Asian markets. The volume of TEU's (twenty-foot equivalent unit), has expanded rapidly in the region in the eight years to 2003. The growth in China has been most startling; on a CAGR basis port throughput has been growing by 20% per annum since 1995.

Figure: 22



Other countries with strong port throughput include Malaysia, Vietnam and India. Growth in Malaysian port activity is a function both of strong export demand and growing competitiveness with the large regional port of Singapore. Growth in Vietnam and India is a function of strong exports as governments remove barriers to trade in a number of areas. Growth in Vietnam is likely to surge again as a result of its accession to World Trade Organisation membership in 2007. This section considers the growth in international trade in Asia, the growth in port traffic and considers some of the key competitive and ownership issues currently impacting ports.

Key drivers

International trade

International trade has been very important for Asia's economic expansion from the end of the Second World War and is the key driver

for port development in the region. Trade growth has generally mirrored economic growth with Japan and Korea enjoying growth periods from 1960 – 1990 and China from 1980 to the present.

Figure 23 shows total merchandise trade for Asia's largest trading nations. The chart shows that Singapore and Hong Kong, two small island nations, rank third and fourth in terms of total Asian trade. This is because 37% of Singapore's trade and 17% of Hong Kong's trade is made up of re-exports; or goods originating in other countries and being processed through Singapore or Hong Kong. Furthermore, growth in trade was strongest in the ten year period until 1977. This period marked the peak of Japanese growth. China's growth in trade was strongest in the most recent ten year period to 2007.

Figure: 23



Total merchandise trade in the region is likely to continue to grow at greater than 10% per annum. It is likely that China's impact on trade in the region will be greater than the impact on trade of Japan. China will continue to expand its exports; driven by cost competitiveness and growing demand due to globalisation and from other emerging nations across the world. China will also require significant imports, many of which will be sourced from other Asian markets including Korea and Japan. China's demand for imports from these higher income countries will rise as it moves up the value chain of production.

A further driver for trade in the region would be any political agreement that created a free trade agreement within the region. The impetus for such an agreement may be the already agreed China-Asean free trade agreement that is due to be fully implemented

in 2015, with the original six Asean nations (Indonesia, Malaysia, Singapore, the Philippines, Thailand and Brunei) joining in 2010. The agreement would create a zero-tariff market of 1.7 billion people, the largest in the world. The success of this agreement, pushed by China, would spur trade and trade liberalisation across the region.

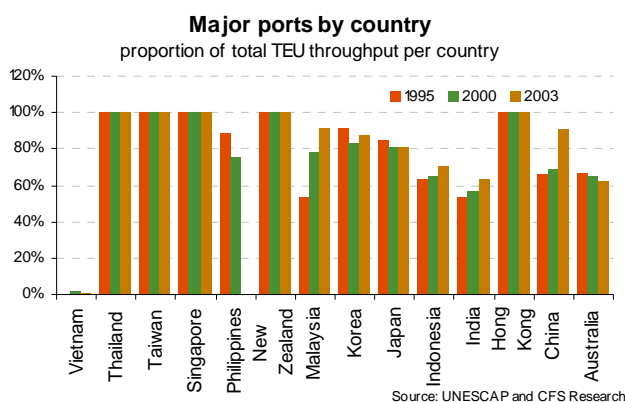
Other issues

Individual ports in Asia

Hong Kong and Singapore are the biggest ports in Asia. The next five largest ports are Shanghai, Shenzhen of China, Busan in Korea, Kaoshiung in Taiwan and Port Klang in Malaysia. Each of these ports has total TEU throughput of greater than 5 million per annum. Many Asian ports are growing quickly including Tanjung Pelagas in Malaysia that has grown from just 420,000 TEU's in 2000 to 4.2 million TEU's by 2004.

Figure 24 shows the percentage of TEU's travelling from one country that flow through that country's major ports. All TEU throughput travels through the major ports in Thailand, Taiwan and New Zealand. The least consolidated markets are in Vietnam, India, Australia and Indonesia. Geography explains the low consolidation in India, Australia and Indonesia where large land masses and long coast lines make a greater number of ports efficient.

Figure: 24



Vietnam

In Vietnam the low level of consolidation is a function of previous regional planning models. Prior to trade liberalisation each coastal province in Vietnam was allowed to develop at

least one port, meaning Vietnam now has over forty ports. The biggest port, Da Nang, takes just 2.0% of Vietnam's total TEU throughput. As the impact of WTO membership expands in Vietnam there is greater demand, particularly from the manufacturing sector, for larger port developments. An example is the development at the Hiep Phuoc port in Ho Chi Minh City. The US\$510m project is a joint venture between Hong Kong investors and the Vietnam Southern Food Co. whose exports were constrained by a lack of port capacity.

The hubs: Singapore and Hong Kong

The region's largest ports; Singapore and Hong Kong face mixed futures. Singapore is under pressure from competition in Malaysia and to an extent the development of the Johor Baru region in southern Malaysia. However Singapore's woes are limited in comparison to the changes in Hong Kong.

The ports of Hong Kong are facing significant competitive issues. The process began with the hollowing out of the economy's manufacturing industry that removed a local market for the ports. Manufacturing has fallen from 14% of GDP in 1991 to 3% in 2007. As China opened up and exports from the Pearl River Delta grew, Hong Kong initially benefited as a 'gateway' to China. But as trade expanded quickly, the development of ports within the Pearl River Delta also accelerated. This has now contributed to Hong Kong's diminishing competitiveness as a port within the region. Cheaper labour and shorter distances between factories and ports make mainland ports more competitive by about US\$200 per TEU. Ultimately there is a strong likelihood that Hong Kong's ports will become redundant and will ultimately be sold to property developers.

7. Water sector

Access to water is a fundamental step in a country's economic development. Without access to clean and running water within each household, a portion of each day requires people to carry water and so limits more profitable economic activity. In addition, households need access to sanitation, including sewerage and waste management, to help avoid the diseases that reduce life expectancy and limit the ability to take part in economic activity.

Water is also crucial for the urbanisation process. In rural areas the population can source its own water from rivers and rainfall and generate its own sewerage provision. As large populations urbanise, the need for central water provision in cities rises. This creates a burden for the government or an opportunity for private enterprise to invest in water provision and sanitation assets.

In Asia the access to water and proper urban sanitation is not yet uniform across the region. In the developed countries of North Asia and also Singapore, the entire population has access to water and sanitation. However in developing Asia there are large gaps in the level of service provided.

Figure 25 shows the level of access to improved water sources amongst a selection of developing Asian nations. Improved water sources include household connections, public standpipes, bore-holes, protected dug wells, protected springs, and rainwater collections. It shows that in Thailand and Malaysia nearly the entire population has access to water while elsewhere there are large deficiencies. Of the selected countries there are 553 million people without access to an improved water source.

The situation in urban sanitation provision is similarly weak in these developing Asian countries as observed in Figure 26. The chart shows that in many of these countries access to urban sanitation is even lower than access to mains water, particularly in India, China, the Philippines and Indonesia. However it shows that a sharp improvement is possible, as is evident from Vietnam's rise from 58% to 92% over the fifteen years surveyed by the World Bank. Vietnam's success has come as a result

of a concerted national strategy for urban sanitation and a relatively small urban population.

Figure: 25

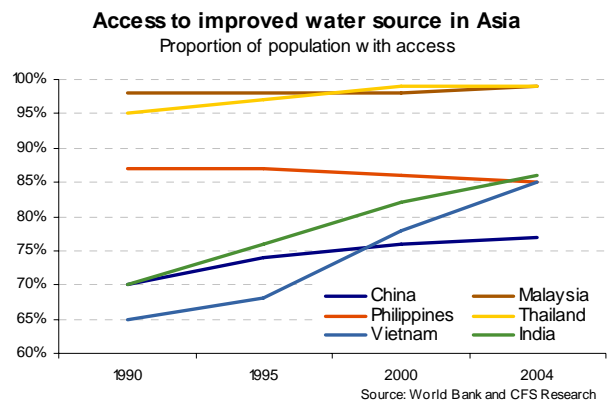
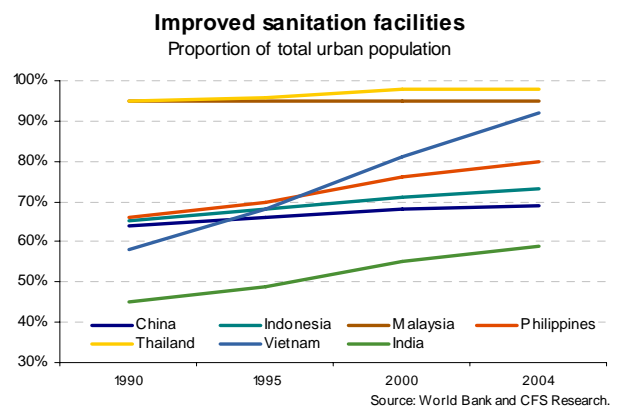


Figure: 26



Key issues

The following sections highlight the problems that individual countries are having providing water to their populations, both urban and rural.

The Philippines

The ability of the Philippines to provide water for its urban and rural populations is under significant threat. The improvement in sanitation in the Philippines between 1990 and 2004 is being offset by the fall in access to an improved water source. The Philippines faces the risk of a water crisis by 2010. Despite high average rainfall in the country, the supply of fresh water is adversely affected by over-extraction of ground water, water pollution, deforestation and lack of catchment basins. The water available to each person each year in the Philippines is the second lowest amongst all Southeast Asian countries.

Nine key cities are experiencing water supply constraints, including Metro Manila. The impact of deforestation and other pollution of waterways means only 36% of the country's river systems are possible sources of public water supply and 50 of its 421 rivers are classified as 'biologically dead'.

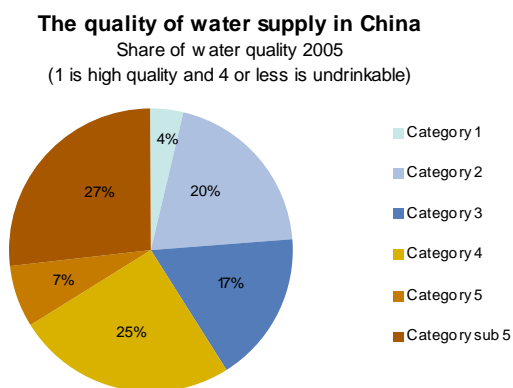
China

China has two difficulties; there is a shortage of water in its large population centres and the water it does have is contaminated.

China's population centres in the north-east of the country, including Shanghai, Beijing and Tianjin are in relatively dry areas. However the majority of China's water comes from the south; the tropical south-eastern provinces and the Himalayas. This makes water security a key issue for China with political and economic ramifications. It highlights the importance of provinces such as Tibet and plans to build three south-north water canals at a cost of between US\$150 to US\$200bn.

The water that does reach urban areas is often of very low quality. Figure 27 shows the percentage of water by quality in China in 2005. All water below Category 3 is considered undrinkable. The chart shows 59% of water is at least undrinkable. The Chinese Institute of Water Resources has reported that 80% of domestic waste water is released without any form of treatment, impacting 90% of urban water and 70% of rivers.

Figure: 27



Source: China Sustainable Development Strategy Report and CFS Research.

The Chinese government is addressing these issues by welcoming foreign investors that participate in urban water supply and sewerage disposal projects according to

China's Construction Minister Wang Guangtao in 2005. China has granted concession rights for private companies to improve project efficiency and water quality in the last three years. Increases in the price of water provide incentives for private companies to make water-related investments and reduce water wastage. The water theme has attracted many companies leading to high acquisition prices for water projects including international water companies like Veolia and Suez.

India

The Indian government announced in its 11th Five-Year Plan that it would spend over US\$100bn on water, sanitation and irrigation infrastructure between 2008 and 2012. However, the Planning Commission expects only around 3% of the investment in water and sanitation and zero for irrigation to come from the private sector. This is reflective on the investment environment for water in Asia; without regulatory frameworks and users prepared to pay for services, water is unlikely to see significant private investment.

In India the problem, according to the World Bank, is a large dependence on underground water supplies leading to rapidly declining water tables. Around 70% of India's irrigation needs and c80% of its domestic water supplies come from groundwater. World Bank research indicates a number of areas in crisis and that by 2020 demand will exceed all sources of supply.

The provision of formal irrigation and water supply services is the virtual monopoly of government agencies. The public sector in India tends to provide poor and intermittent service. The exceptions are in areas where industry has taken over provision of the service. In these cases industry wins through improved and secure water provision to the industrial process and the improved health of its labour and customers.

This is reflected in the limited participation of the private capital in the sector in Asia. From 1990 to 2006 just US\$27bn of water infrastructure has been privately funded. A large share of this money has been directed to Malaysia and China; US\$10bn and US\$7bn respectively.

8. Research Team

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