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Expert know-how for Credit Suisse investment clients

Global **Investor**

New challenges and opportunities of globalization
Banking for 7 billion and for 7 million

Basics Global warming, real estate investment trusts, public-private partnerships, European public sector bond issuers
Enrichment Digital advertising, liberalization of sports betting
Switching Nanotechnology, alternative investments, brands in the emerging markets

Photo: Yann Layma/Getty, Cover Liu Jin/Stringer

Hangzhou, China

Urbanization

In sheer numbers, it is like creating a new Barcelona every ten days! The world's population has expanded on an unprecedented scale, from just three billion people in 1960, to almost seven billion now. This population increase has been more and more focused on mega-cities in both emerging and developed countries. This surge in urban living is enabling many people to raise their incomes far above the low levels seen in rural areas – creating a pool of new spending power and triggering major investment opportunities.

Day 50
Day 40
Day 30
Day 20
Day 10

Figure 1 Global urbanization…

World population in billions

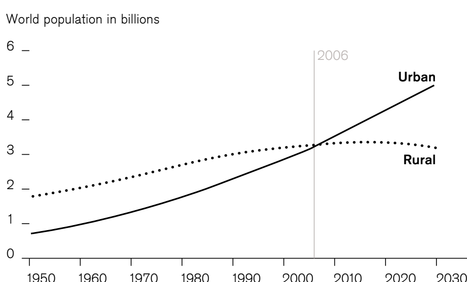
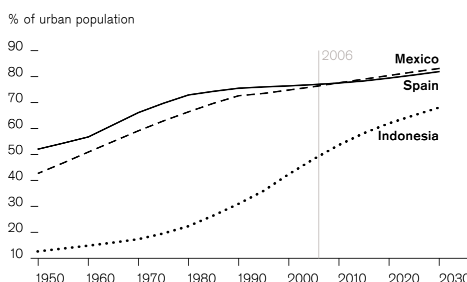


Figure 2 … driven by emerging markets

% of urban population



Source: United Nations, World Urbanization Prospects

World income distribution

World income distribution is clearly led by the West, followed – with a few exceptions – by Latin America, Central and Eastern Europe, Asia and Africa. Currently, the USA is the clear leader, but some of today's leading countries might be challenged in the future.

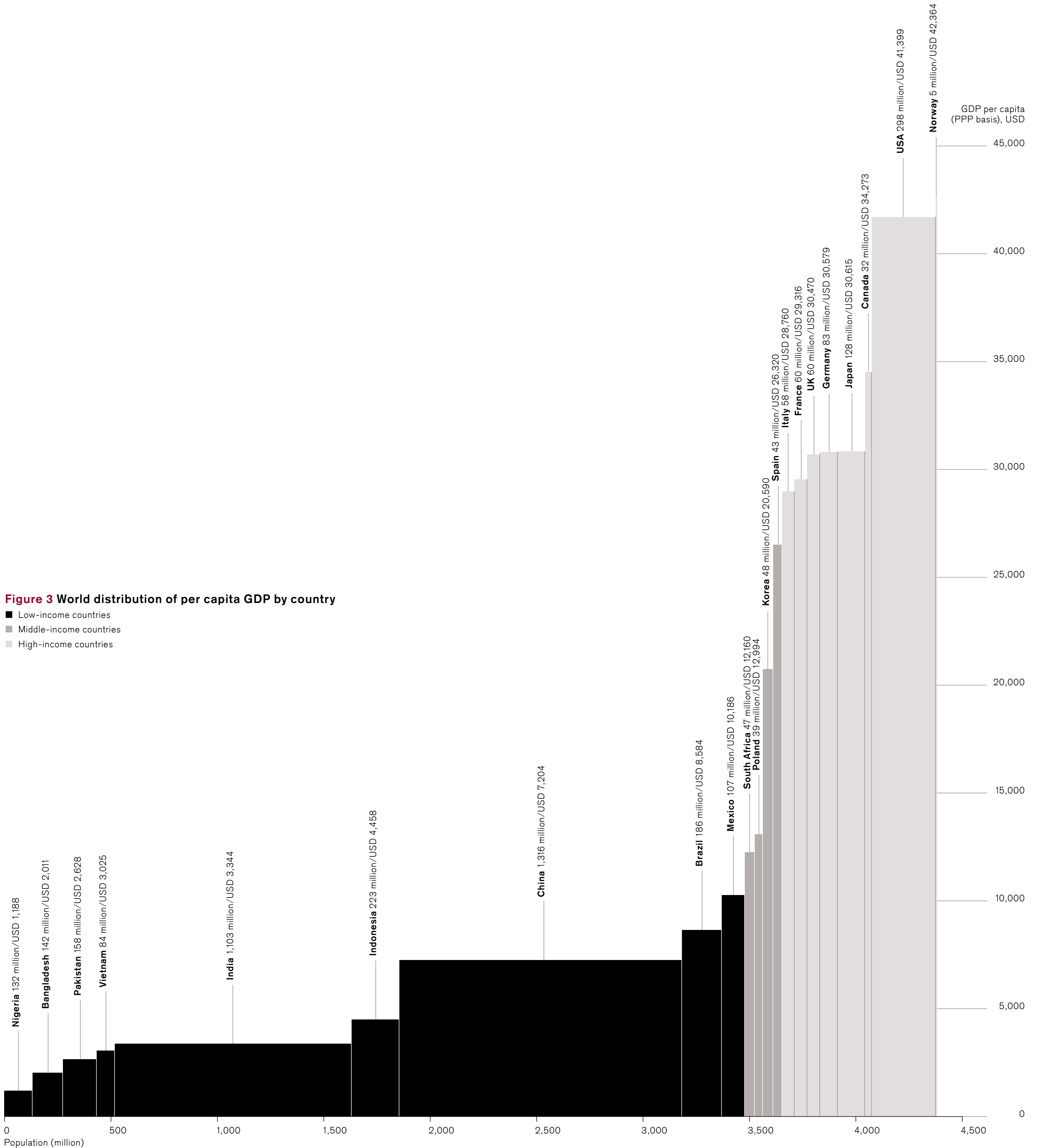


Figure 3 World distribution of per capita GDP by country

Source: IMF World Economic Outlook Database, April 2006, UN Population Prospects: The 2004 Revision, Credit Suisse

Dubai, United Arab Emirates

Photo: Victor Romero/Stringer

The next big thing: Small? In this issue we prove once and for all that size really does matter. From the world's emerging mega-cities to the marvels of nanotechnology, Global Investor's fresh perspectives on fascinating global trends bring some interesting opportunities to light. Not least of these is nanotechnology. Put simply, nanotechnology is the science of small, measured in billionths of a meter. An enabling technology that will be embedded in materials and equipment, it could change science, medicine and industry dramatically. It may not only affect the way we live, but how long we live. Medical advances could result in a substantial increase in the number of elderly. Some have made Malthusian predictions, but I prefer to be an optimist. Every major technological advance has entailed adjustments but, over time, quality of life has generally improved. Nanotechnology could allow developing economies to leapfrog older technologies. In Asia, China leads in terms of national planning, research and funding, South Korea in patents and public-private sector cooperation, and India in commercializing technology.

For investors, nanotechnology presents a Rubik's cube of possibilities. What can be commercialized? Which countries will gain competitive advantage? How will demographics be affected? Disruptive and transformational, nanotech could severely impact existing industries and commodities. For example, if ceramics can be made strong and light, what would happen to the market for steel? The article on page 53 gives answers to these questions and more.

While developments may be years away, opportunities exist for those willing to make a long-term investment. Consider transistors, the basis of today's computer technology, which were invented in 1947. The integrated circuit was created 11 years later. Investors did not see a handsome return until the 1980s – 40 years after the initial technological breakthrough. Credit Suisse is already a keen observer of nanotechnology. That's no surprise – for 150 years, we've celebrated a tradition of innovation. We know that, with the right advice, small may be bountiful.

Enid Yip, Hong Kong Branch Manager

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Berlin, Germany

Photo: Thomas Eugster

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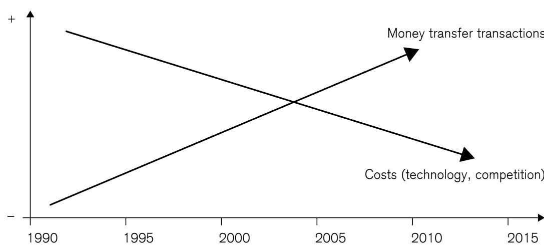
Photo: London Calling Centre Ltd (LCC), Source: Credit Suisse

Figure 4 Why the bottom end is becoming profitable



USD 232.3 billion in remittances

The sheer number of people living outside their home country is increasing dramatically. The official estimate is currently 175 million. The rapid migration is drawing tens of millions of people out of poverty into at least the lower end of the income scale of modern society. As these shifting populations find jobs and earn income, the demand for quality banking services at a low price grows, especially transferring money to support relatives at home. For example, London Calling Centre Ltd (LCC) executes money remittances for foreign residents in the UK.

Banking for 7 billion and for 7 million[1]

Today's global population is far larger than ever before, and is shifting spatially, financially and socially at a pace without historic parallel. New banking technologies drive a new financial services industry fit for twenty-first century clients. As recently as ten years ago, banking for individuals was almost entirely aimed at middle-income groups, with private banking services for high net worth individuals as an important, but niche, market. Now, the scale of private banking is rising rapidly to serve the new pools of wealth created by globalization, but at the bottom end of the pyramid, a completely new business of large-scale, very cheap but fair-quality banking services is being created off new technology platforms.

Giles Keating, Head of Global Research, **Christine Schmid,** Equity Sector Analyst

Over the last five decades, the world's population has expanded on an unprecedented scale, from just three billion to approaching seven billion now. Nothing like this has ever been seen in human history. The large majority of the population increase has occurred in very poor regions **(see figure 1 and 2, on page 4)**, but now a very rapid migration, part spatial, part social, is bringing tens of millions of people out of poverty and into at least the lower end of the income scale of modern society. This is occurring through vast movements of people from countryside to cities in China, through the creation of new jobs within the world's mega-cities from Mexico to Bangalore, and more controversially, through large-scale population shifts from poor regions to the world's rich nations, whether across the Mexican-US border or into Spain, which even on official figures has gained some five million people over the past five years. As these shifting populations acquire jobs, income and homes, their need for quality banking services – at a very low price, but in aggregate in very large quantities – has created an extraordinary opportunity for those banks astute enough to seize it.

At the opposite end of the spectrum, the private banking business is exploding thanks to new wealth growth of some 6% p.a. created by globalization. The high net worth population grew at a record pace between 2004 and 2005 in emerging market countries: South Korea led the way at 21.3%, followed by India (19.3%), Russia (17.4%), Indonesia (14.7%) and 14.4% in Hong Kong **(see figure 2 on page 4, figure 3 on page 5, and figure 5 on page 14)**. Intergenerational wealth transfer in the developed western part of the world

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Indonesia

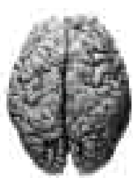
Malaysia

Poland

England

Ireland

Photo: UHB Trust/Getty



Brain drain

Migration out of Poland might trigger migration from another cheaper country, such as the Ukraine or Malaysia to fill the gap, which again results in a further population shift. Also, the number of Germans leaving home in search of a better work environment abroad is higher than at any time since the fifties, with a marked drain among young, skilled people.

will increase dramatically. Both developments call for a clear shift in front units' service strategies as well as in product and wealth management structures towards an embedded wealth management model.

Infrastructure investments to boom further — The search for work and prosperity is fueling the growth of the mega-cities. The United Nations expects close to 60% of the world's population to be living in urban areas by 2030, up from 48.7% today. To grasp the true dimension of this development: this growth is equal to roughly one new city the size of Barcelona emerging every 10 days! The lion's share of growth is expected to stem from the less developed regions in Asia and Africa. The percentage of the population living in urban areas in Africa is expected to increase from 14.7% in 1950 to 50.7% in 2030, roughly 3.5 times more than at present. The same metrics in Asia imply more than a tripling of the urban population over the same period. The fact that investments in the infrastructure of emerging countries are necessary goes without saying. However, this is also true of older cities in developed markets, which have not been designed for the mobile urban citizen or the sheer size of the 21st century city. This will result in tremendous and costly long-term infrastructure investments as well as a trend towards more decentralization of the biggest cities around the globe. To find a way to finance the infrastructure investments of the 21st century, further privatization, such as plans currently calling for the privatization of parts of the German highway system – until now the country's "sacred cow" – might soon become reality.

Migration gains — The World Bank estimates that a rise in migration from developing countries would generate gains for the world economy to the benefit of all of us. Migration amounting up to 3% of the workforce of high-income countries could lead to a global output gain of USD 356 billion by 2025. This is estimated to be double the global gain from full trade liberalization. Migrants' level of education and salary has an effect on the amount of the remittances they send home. Studies done for the United States suggest that highly educated and well-paid migrants – 80% of Indians working in the USA have a college degree – tend to save and invest in the host country. It is quite likely that the majority of well-educated migrants come from well-situated families not requiring as much support from abroad. By contrast, less educated workers such as the Hispanics in California or Texas tend to send home a higher amount, which is estimated at up to USD 500 per month on average. The migration revolution discussed thus far is leading to new opportunities in banking:

■ Banking for 7 billion people: Today's migration is impacting the whole range of banking services. Many of today's migrants are displaced or are refugees with the potential to become the retail banking client of the near future. On top of this, the mobility of the 21st century citizen is, thanks to short travel distances, higher than ever before, resulting in a rising number of high-skilled economic refugees and the flex-patriate group at the top end **(see figure 7)**.

■ Banking for 7 million people: The vast growth in private banking is currently being driven by Asia and Latin America. Aging in the developed part of the world leads to a generational wealth transfer in private banking. The different needs of new and younger clients, who, as studies show, have a higher degree of investment sophistication, are leading to changes in the structure of private banking services offered.

Labor migration to heat up retail banking

Globally, the number of people living outside their home countries is estimated to be at 175 million and rising rapidly. Although migrant remittances are an old issue in the migration debate, they have received greater attention in recent years. The obvious reason for this is the sharp rise in the flow of remittances into developing countries **(see table 1, figure 4)**, which makes this volume-driven business attractive. The aim of these people is often to support the family left at home. To do so, some form of money transfer service, and hence banking relationship, is required. Migration is likely to give rise to a new group of banking clients and banks will have to adapt their

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Table 1

Source: World Bank, United Nations

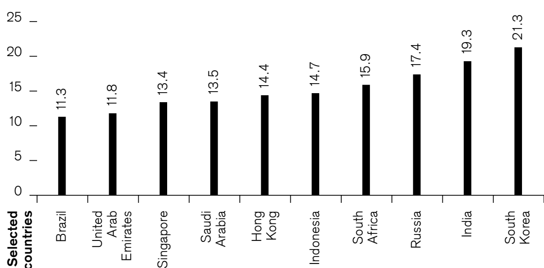
Remittances to developing countries

Today's migration is impacting the whole range of banking services. Globally, the number of people living outside their home countries is estimated to be at 175 million and rising rapidly, with a corresponding sharp rise in the flow of remittances into developing countries at the lower end of the banking range.

in USD bn	1990	1995	2000	2001	2002	2003	2004	2005	Change 2001–2005 in %
Latin America	5.8	13.4	20.1	24.4	28.1	34.8	40.7	42.4	74
South Asia	5.6	10.0	17.2	19.2	24.2	31.1	31.4	32.0	67
East Asia	3.3	9.7	16.7	20.1	27.2	35.8	40.9	43.1	114
Middle Asia and North Africa	11.4	13.4	13.2	15.1	15.6	18.6	20.3	21.3	41
Europe and Central Asia	3.2	8.1	13.4	13.0	13.3	15.1	19.4	19.9	53
Sub-Saharan Africa	1.9	3.2	4.9	4.7	5.2	6.8	7.7	8.1	72
World (developing and industrial)	65.6	101.6	131.5	147.1	166.2	200.2	225.8	232.3	58

Source: Capgemini, ML World Wealth Report 2006

Figure 5 **Growth in HNWI population in % (2004/2005)**



Wealth management a growth business

The growth in high net worth individuals (HNWI) with financial assets over USD 1 million will remain high. Wealth managers face two major changes going forward: stronger growth in emerging markets and the upcoming generational wealth transfer in the developed world. Both trends underpin the need for in-depth relationship banking: knowing the client is key. Segmentation by client needs rather than simply asset size becomes a key focus.

offering to this group's needs. Poor countries are not the only source of migration; it is also being fuelled by the current job market situation as well as demographics. In the future, Germany might become a country with a negative migration balance **(figure 6)**. It is losing its young, high-skilled workforce while attracting a shrinking number of poor, low-skilled immigrants, further exacerbating the imbalances in the social welfare system. As an indication of future developments: of all German students currently enrolled, 60% say they would like to leave Germany.

Another recent example is the migration of Polish workers. Roughly 300,000 mainly young Poles have migrated to Ireland; the estimate for England is up to 1 million. The reasons are obvious: a high unemployment rate of more than 16% in Poland and a huge salary differential. A Polish nurse can earn up to seven to eleven times more in Ireland than in Poland. As a result, Polish healthcare institutions are experiencing a shortage of roughly 60,000 workers. During the past few months, some healthcare facilities have been able to perform only emergency operations. To resolve this situation, the Polish authorities are trying to hire staff from Malaysia. As a result, Malaysia might look to fill the gap with Indonesian employees. One need only imagine the snowball effect this might have, as well as the increase in remittances in the wake of such a shift in banking clients generated by this one example alone. To be competitive and successful, Irish banks are starting to hire Polish-speaking front staff to attract this new retail banking clients.

New competitors for banks — Banks risk missing out on a share of tomorrow's retail clients, namely those who currently have no banking relationship either due to their legal status as immigrants or because they are simply underbanked. New remittance tools using cell phones, smart cards or the Internet are putting pressure on the traditional Money Transfer Operators (MTOs) such as Western Union as well as banks active in this business. Furthermore, supermarket chains are starting to offer cheap credit cards and attracting the underbanked. In Mexico, for instance, where competition has spurred a reduction in the fees charged on the US-Mexico corridor, fees for sending USD 300 have fallen by 56% over the last seven years.

In November 2005, BBVA (BUY) announced it would cut its rates on immigrant services in Spain by 60% and expected to increase its number of immigrant customers by 50% to 600,000 in one year! The BBVA end model will be based on BBVA's branch network (Spain, California, Texas), the Dinero Express network in Spain and Bancomer Transfer Services (FY 2005 earnings: USD 50 million), the current leader in Bajalta California. The main benefit for BBVA is the opportunity to increase cheap funding thanks to a rising deposit base as well as the future potential of the new retail banking clients. Thanks to their geographical positioning, HSBC (BUY) and Citigroup (BUY) also stand to benefit from this development.

The rich are getting richer, but also younger

We are only at the beginning of a decade of a generational wealth transfer, driven by the aging of the more developed and wealthier part of the world. Demographic studies suggest that 15% of the global population was in the 56+ age range in 2005;[2] the percentage of high net worth individuals (HNWIs: over USD 1 million financial assets) is more like 60%. Studies for the US estimate a wealth transfer of USD 41 trillion[3] by 2053. 19% of the HNWI children live abroad. Additionally, the growth in wealth management in emerging

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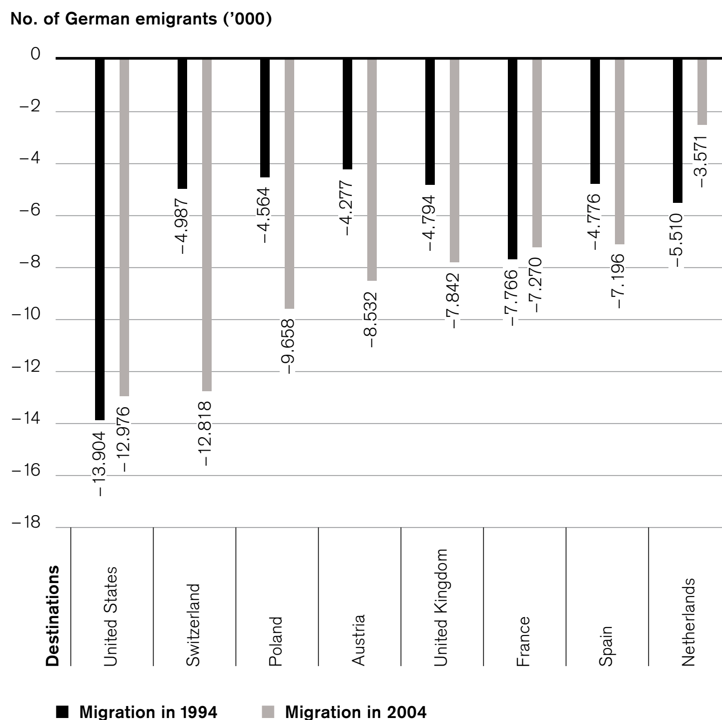
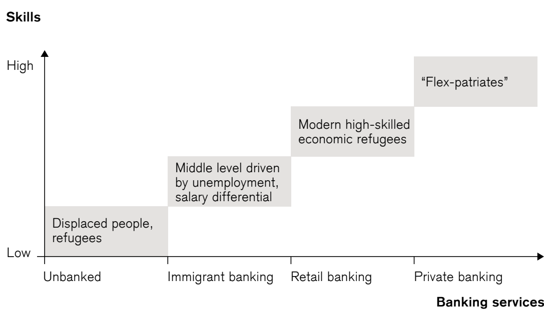
Figure 6 — Source: Federal Office of Statistics

Germans are increasingly leaving their country
Germany is losing its young, high-skilled workforce, while attracting a shrinking number of lower-skilled immigrants. The German population is increasingly looking abroad to find new job perspectives.



Source: Credit Suisse

Figure 7 **Broad migration impact on banking**



Migration revolution

Migration is, in our view, affecting all income groups ranging from displaced persons to so-called "flex-patriates" in search of better financial and/or personal prospects. See above an example of the annual flight diary of a flex-patriate.

market countries is keeping up with the growth in developed countries. Both trends suggest a clear globalization of portfolios that used to be invested more locally. Furthermore, the new clients are expected to be more active in the financial decision-making process **(see table 2)** – a clear challenge for today's financial advisor. Knowing the client and serving them according to their needs will be the factor for success during this transitional and growth period in wealth management, and not the pure segmentation according to the size of their financial assets. A study done by Phoenix marketing international[4] for the US market shows that high net worth individuals increase the number of banking relationships until the age of 50 as they need broad banking services for their daily life and family matters, such as student loans or leasing. After the age of 50, the number of relationships with banks usually starts to shrink. Clients shift assets mainly to their primary provider of financial services. The future strategy for banks is clear: be among the primary service providers, or very simply, "big is beautiful," as the largest players are expected to grow above the market growth rate. Due to the fragmentation of the wealth management market, we expect the biggest companies with a well-known global brand and a decent track record to grow above market average, and anticipate acceleration in M&A activities among the smaller players in the sector.

Currently, 15% of households in the US with more than USD 1 million in investable assets are headed by a woman as the primary financial decision maker.[5] Women as a group of clients will increase in importance going forward as the number of wealthy widows will rise due to demographic developments and the rising number of wealthy working women. Overall, they favor a full service firm and are less risk tolerant, i.e. they have more diversified portfolios which are more focused on wealth protection. Banks that want to be successful with this growing segment must consider these factors and address them accordingly.

Varied and rising demand for talent — Rising client sophistication and greater demand for workers in fast-growing regions such as Asia, Latin America and the Middle East might lead to a shortage of skilled senior banking staff and is likely to drive remuneration levels up. Initiatives to train and educate young front staff already started a couple of quarters ago. Furthermore, financial institutions are shifting senior bankers from the institutional side to wealth management to meet clients' needs.

The solution: Embedded asset management model — Banks that aim to gain the customer of the future will offer a global reach, a wide range of products, sound advice, a strong brand name and reputation based on proper risk management as well as excellent distribution and execution capabilities. A clear commitment to the business – wealth management in its broad definition including manufacturing, i.e. asset management – and knowing the client is key for gaining both customer trust and ensuring long-term success and growth in this relationship business. ■

Table 2 Source: Capgemini/ML RM survey, March 2006

Generational wealth transfer

Generational wealth transfer is being driven by the aging of the more developed and wealthier part of the world. Studies in the USA estimate a wealth transfer of USD 41 trillion by 2053.

Financial advisors believe that the inheritors are more …	Disagree	Agree
… focused on international investments	17%	83%
… risk-tolerant	32%	68%
… engaged in financial decisions	25%	75%
… focused on wealth accumulation	32%	69%

[1] We chose catchy numbers for this headline. Strictly speaking, there are 8.6 million people with financial assets over USD 1 m, according to the Capgemini/Merrill Lynch Wealth Report. Seven million might better refer to investors with over USD 1.5 m. And global population is currently just over six and a half billion, and expected to reach seven billion in the near future.
[2] United Nations
[3] The Journal of Gift Planning. Vol. 7, No. 1, 1st Quarter 2003
[4] Phoenix Marketing International, published at the UBS investor day 2006
[5] Source: Phoenix Marketing International

The elephant can dance

Despite a well-educated and technologically adept workforce, and immense natural resources, India faces huge obstacles to growth and development. But where there are risks, there are also opportunities, and where there are challenges, there are solutions, says Nand Kishore Singh, Deputy Chairman of the Planning Commission of the Government of Bihar and former main advisor to India's Prime Minister. **Marcus Balogh**, Bulletin Magazine

Marcus Balogh: India is supposed to be an emerging superpower. The question is: can it really fly?

Nand Kishore Singh: Yes, India can fly. Absolutely. Or perhaps, as we are speaking about India, it would be better to say: "the elephant can dance!"

For a long time, it seemed as if India was not progressing very rapidly. Has this changed?

Nand Kishore Singh: You must take into consideration that India started its current reforms only in 1991. The nineties saw overall economic growth of 6%–6.2%. In the last three years, India has grown over 8% and the draft of its 11th five-year plan spanning from 2007 to 2012 projects average growth of 8.5%, which means that there will also be years with growth of 9%–10%.

How are you going to achieve this?

Nand Kishore Singh: In my view, what we have to do is fivefold. First and foremost, we have to continue with strong macroeconomic fundamentals. We need fiscal consolidation, which is now enacted by law, and inflation, which is hovering around 4%–5%, and the revenue deficit to drop to zero by 2008. We also need a fiscal deficit of 3% by that time, and finally, we need to finance the current account deficit through foreign direct investment. We also have to work on the composition of India's Gross Domestic Product (GDP). About 24% of our GDP stems from agriculture, 50% from services, and 25% from manufacturing industries. This is not the ideal ratio, particularly from an employment angle. China, in comparison, has managed to transform itself. For example, 38%–40% of its GDP is derived from industry and manufacturing. This is the direction we will have to take.

Let's talk about the four other areas that need improvement.

Nand Kishore Singh: It is equally important that we modernize agriculture, where 58% of the working population finds its subsistence. India's agriculture has been growing by 1.5%–2%. But we need to grow to at least 4%–5%, not only to give us continued food security, but also to meet changing consumer preferences.

What about infrastructure? For many outside of India, infrastructure reform seems to be a major issue.

Nand Kishore Singh: It is a major issue. India has been very deficient in the quality and effectiveness of infrastructure. But I can say there is now a serious political will for improvement.

"But I can say there is now a serious political will for improvement."

Can you give an example?

Nand Kishore Singh: Five years ago, we opened up India's telecom sector. Today, it is totally deregulated, and the cost of data transmission or the cost of voice transmission is lower than in the rest of the world. This has enabled India to become one of the world's most dominant players in terms of attraction of global outsourcing. The telecom story is more or less a complete story of very high quality and dependable infrastructure. The only challenges that remain are the questions of how to use the spectrum more efficiently, and how to penetrate India's rural sector with higher density telephony.

What about India's transport sector – does it still deserve the reputation of being large, diverse and very chaotic?

Nand Kishore Singh: When you visit India two years from now, that story will have dramatically changed. The previous government began a program called the national highway development program, in which, for example, the big four metropolitan ports of Delhi, Mumbai, Chennai and Calcutta, popularly called the Golden Quadrilateral, were connected by much-improved roads. In addition to that, we have something called the North-South/East-West spine, which links Cashmere to the south of India, and the eastern part of Calcutta to the western part by a spine that will be completed in three years. There are three other phases of that program, including linking every village in India of a population of 1,000 and more with a road. India's road-building program is, in my view, one of the most massive programs that the world has ever seen. It will require an investment of at least 150 billion dollars. That program is substantially under way, and is enticing the interest of many foreign investors.

Let's move to the third area. What is it?

Nand Kishore Singh: Energy! Energy will be the touchstone of India's ability to improve its infrastructure. We have a

new electricity act that deregulates generation, transmission and distribution. And it is possible to develop stand-alone companies now, as the sector is fully delicensed, meaning anybody can set up those entities.

What is the fourth area?

Nand Kishore Singh: Demographics. Out of 1.1 billion Indians, 700 million are in the working age group. By 2015, we will have an addition of another 85 million people. If the past is any guide to the future, and if the experience of the Asian Tigers is an indicator of what could happen, then the young population will mean higher savings, higher investment, higher growth, higher consumption – all ending in a virtuous circle.

If the Indian government wants to make its 11th five-year plan a success, it will also have to attract foreign direct investment, which is now at about 2%, compared with more than 8% in China. How will India attract more foreign investment?

Nand Kishore Singh: That is a major question. You cannot attract foreign direct investment if you do not attract general investment. And as our reforms are clearly targeted at facilitating and encouraging investments, foreign direct investment will profit as well. Restrictions have been modified, and many of them have been completely cut. The tax rates are moderate, and I think that the policy framework has aligned itself with best international practice.

Why should foreign investors turn to India and not to China? What competitive advantage does India have?

Nand Kishore Singh: Let me begin with the advantage that China has over India. China has a much better infrastructure. It is more affordable, more efficient and more predictable. But we are getting there. One of the major differences is that China has a graying population. Its one-child policy, and its better success in demographic management, compared with our failure in that area will be its weakness and our window of opportunity. By 2015, the demographics in China will not look good. By 2015, we will be the only country which will have surplus labor and a yearly young contribution to the labor force. I think if you look long term, you need to look at the demographics because they provide savings, investment and consumption.

Looking toward the near future, which sector would you suggest investors pay special attention to?

Nand Kishore Singh: Every sector is making money. Chose the travel industry with its booming hotels, airports and civil aviation. But also look to real estate, the hospital industry, nanotechnology, construction, pharmaceuticals and the service sector. These sectors are all growing because 1.1 billion people need to live in dignity with a high quality of life. India is large enough to meet the needs of any potential investor.

“Out of 1.1 billion Indians, 700 million are in the working age group.”

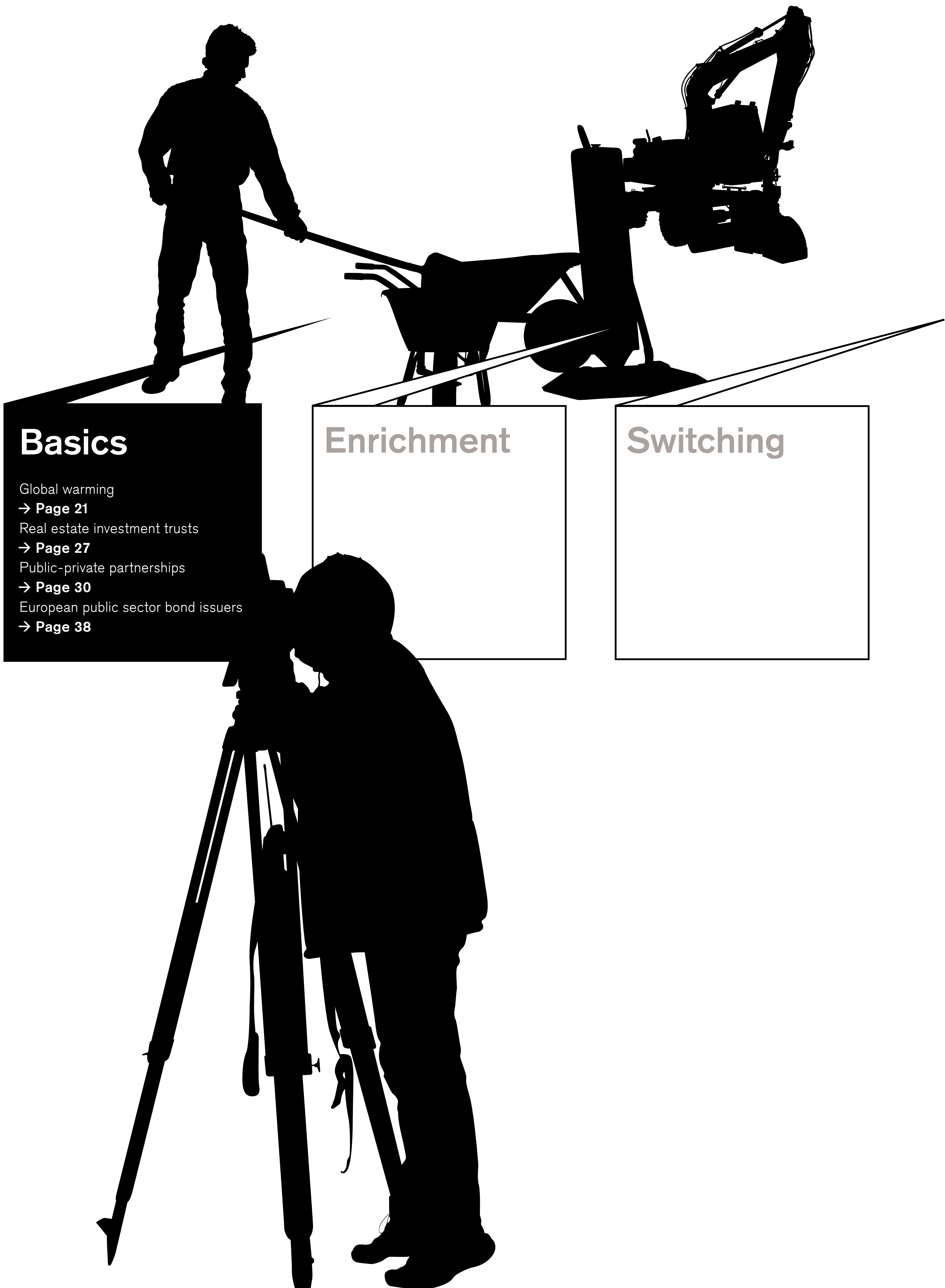
Still, there must be sectors that are more interesting than others.

Nand Kishore Singh: Energy is a sector that is very interesting. And with energy comes mining and coal. India also has huge strength in the pharmaceutical sector. And then, India is fast becoming a global hub in the automotive industry. ■

This is an excerpt from Nand Kishore Singh’s interview published in Credit Suisse’s stakeholder-magazine Bulletin 04/2006.
To order Bulletin please go to Credit Suisse’s internet publication shop:
http://emagazine.credit-suisse.com/shop/

Photo: Oliver Lang

Nand Kishore Singh is Deputy Chairman of the Planning Commission of the Government of Bihar. His political and academic career encompasses an impressive number of positions and achievements. Between 2001 and 2004, he was a member of the Planning Commission of the Government of India; between 1998 and 2001, he acted as the Prime Minister’s main advisor for economic issues. He is also a distinguished scholar and a guest lecturer at several universities and economic institutions.



Basics

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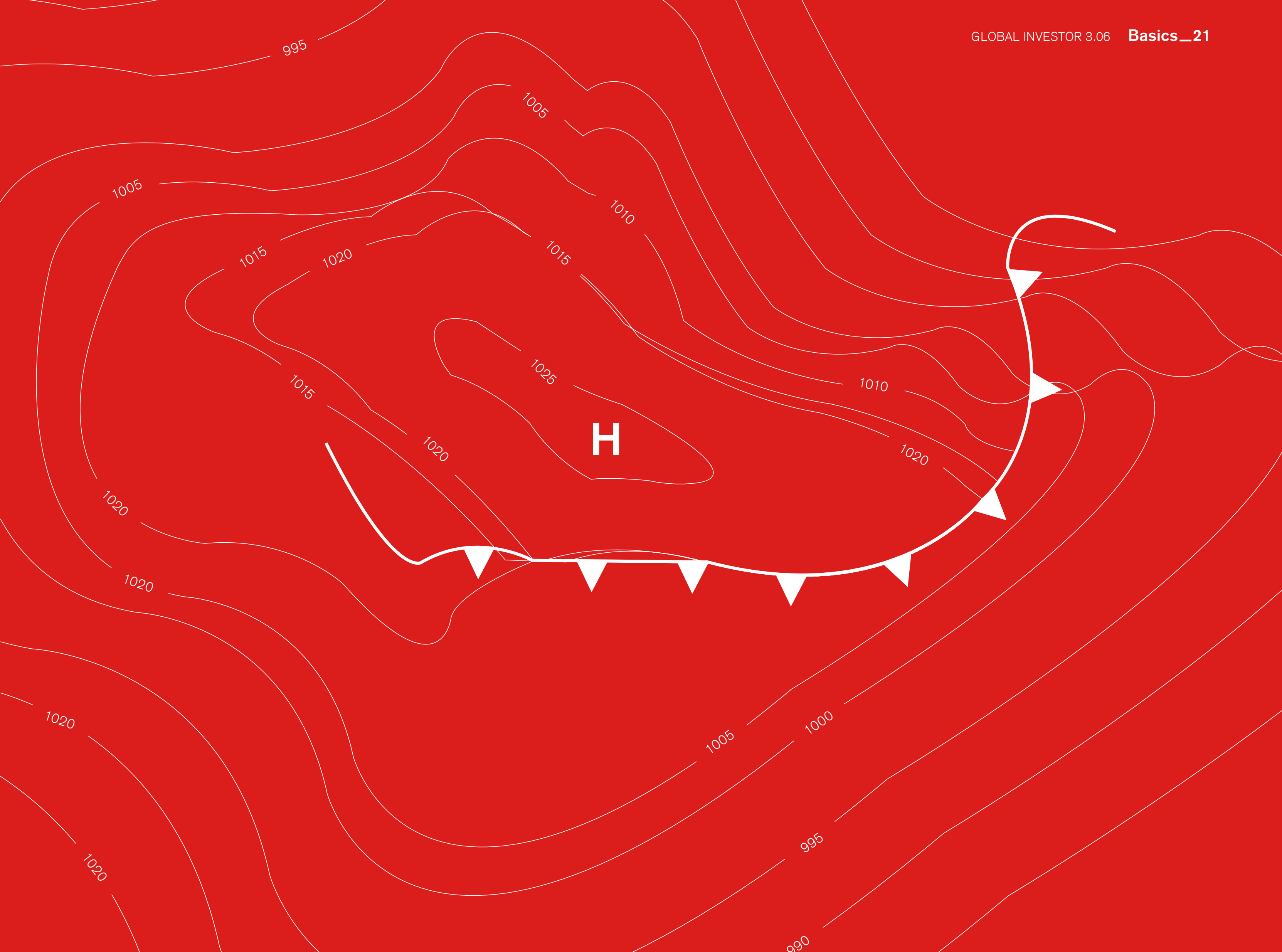

The global warming phenomenon

It was only half a century ago that scientists thought global warming was hardly likely to be a problem. It took decades of accumulated evidence, hard-fought debates and numerous policy developments along the way to convince them they were wrong. In the present century, every respectable panel has expressed concerns about climate change, with many concluding that it will probably be a severe problem, and soon.

Etrita Ibroci, Trading Strategist, **Ruth Yeoh,** Global Research Trainee

"Climate change, deforestation, the voracious drain on natural resources cannot be ignored. Unchecked, these forces will hinder the economic development of the most vulnerable nations first and, ultimately, all nations." **Tony Blair,** UK Prime Minister, Address to US Congress, July 2003

As the LA Times aptly puts it, "Global warming is a deadly threat precisely because it fails to trip the brain's alarm, leaving us soundly asleep in a burning bed."[1] The earth's temperature could rise under the impact of global warming to levels far higher than previously predicted, according to the United Nations' team of climate experts. Since 1960, the average global temperature has risen by one degree Celsius, and it is expected to continue to rise. The National Academy of Sciences recently presented to Congress a study indicating that the earth's temperature is now the hottest it has been in 2,000 years, and humans are responsible for much of the warming. In addition to the implications of a rise in global average temperatures, secondary effects will include rising sea levels and a rise in extreme weather patterns. In some regions, damage from climate change has become glaringly visible, with stronger hurricanes, floods and disintegrating ice sheets as testament to its merciless severity. Climate change may well be the greatest threat and challenge facing our generation, putting tremendous strains on the environment, the world economy and individual businesses. We believe global warming will have both negative and positive implications for global economies and regard climate change as a clear risk. Long-term planning is one way of mitigating its potentially irreversible effects. Global warming has been linked to growing emissions of greenhouse gases (GHGs) caused by human activities. According to Eurostat, a vast majority of GHGs are from CO_2 (CO_2: 83%, methane: 8.8% and nitrous oxide: 6%). CO_2 concentration in the atmosphere has shot up by 11% since the beginning of industrialization and is expected to double this century. According to a recent International Energy Agency (IEA) report, carbon dioxide emissions and oil demand will continue to grow rapidly over the next 25 years, and this worrisome trend is likely to worsen, extending this outlook beyond 2030 **(see figures 1, 2 and 3)**.

The climate problem cannot be solved piecemeal. The challenge is to create new energy systems that not only protect the climate but are also economically superior. The burgeoning markets for energy-efficient technologies – such as solar panels, wind turbines and biofuels – show what can happen when strong national policies are enacted. The global market for renewable energy technologies topped USD 25 billion in 2004, and is already helping to reduce greenhouse gas emissions in countries such as Germany and Spain. Scientific and political pressures are leading to better policies on climate change, while social changes and corporate action are producing a wide range of private-sector solutions as well. We believe these dynamics will affect most companies and create many investment opportunities. Many governments consider technology the best means to combat climate change.

Renewable energy: The way to the future

Renewable energy is the fastest-growing energy sector in terms of annual percentage increase, and has significant potential in helping to achieve global environmental, economic, safety, social and sustainability goals. According to a report released by the Renewable Energy Policy Network for the 21st Century (REN21), global investment in the clean energy sector (excluding large hydropower plants) reached a record of USD 30 billion in 2004, pushing renewable energy capacity to 160 GW and representing 4% of global capacity. It is becoming a big business, attracting some of the world's largest companies, including Sharp, Siemens, General Electric and Royal Dutch Shell. Market leaders championing renewable energy in 2004 included China (solar hot water), Germany (solar electricity), Brazil (biofuels) and Spain (wind power) **(see table 3)**. The fastest-growing energy technology is grid-connected solar photovoltaic (PV) systems, whose capacity has increased by 60% per year from 2000 to 2004. Other renewable energy power generation technologies include biomass, geothermal and small hydro facilities, which are mature technologies and growing at rates of 2%–4% per year. Some claim that renewable energy is not cost-effective,

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Figure 1 Source: Carbon Ventures

Sources of global GHG emissions

Global GHG emissions are increasing in the wake of robust economic growth and the related increase in demand for electricity and fossil fuel.

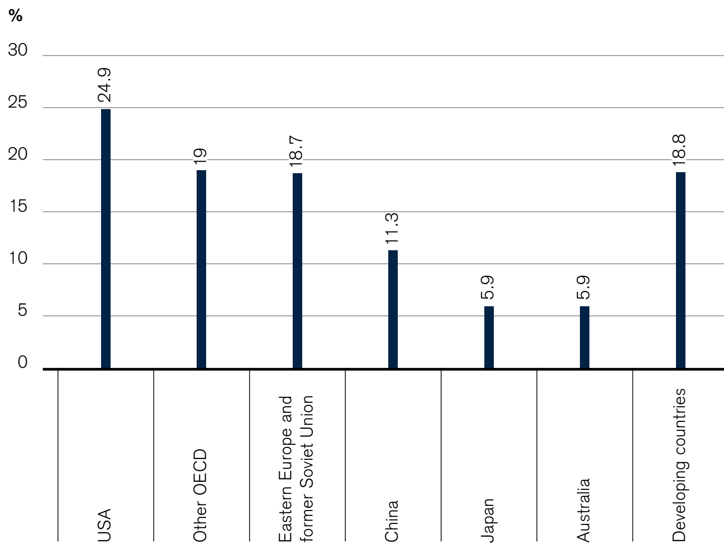


Figure 2 Source: Credit Suisse, CDIAC, UNEP

Growing CO_2 emissions

The Energy Information Administration (EIA) estimates global CO_2 emissions will increase by 75% from 2003 to 2030. Emissions increased by 2.5% per year from 2000 to 2002, mostly from developing nations.

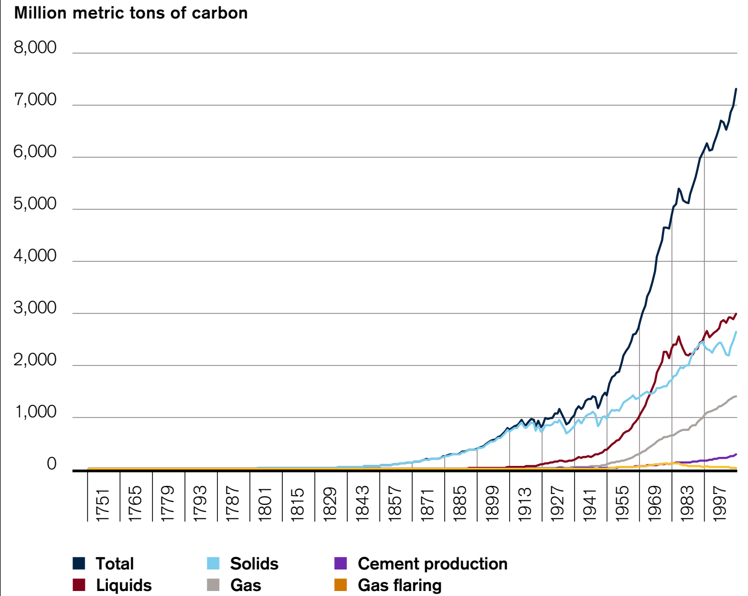
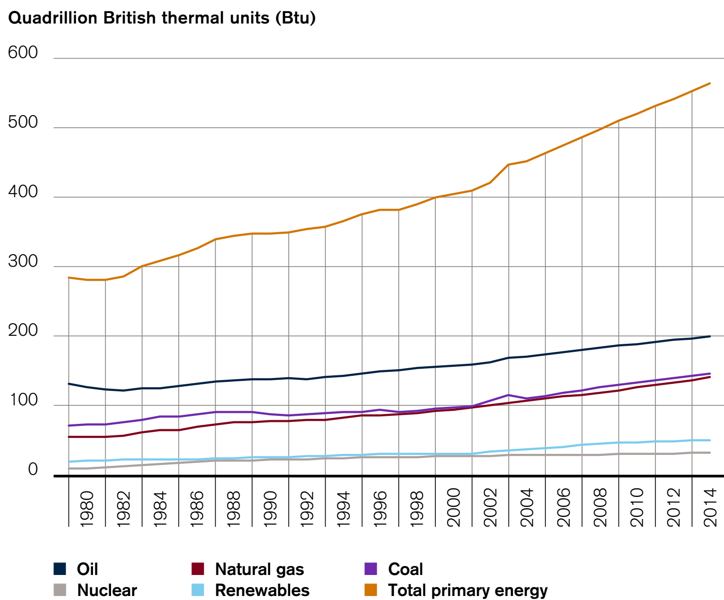


Figure 3 Source: Credit Suisse, IEA, EIA, International Energy Outlook 2006

World primary energy consumption

World primary energy consumption by fuel type (million tons of oil equivalent, MTOE) is shown for the years 1980 to 2005, with demand forecasts up to 2015. Asia accounts for three-quarters of growth.



as it often needs government incentives in order to be viable. However, it can be argued that the efforts involved in extracting oil from ever deeper reservoirs is increasing. The costs of renewable energy technology have been shown to fall with increased investment and capacity expansion. Therefore, the cost of renewable energy could drop below that of fossil fuels.

Why renewable energy?

Global warming has in part been attributed to increased CO_2 emissions, spurred by strong energy demand linked to economic growth. Historically, energy consumption has been primarily linked to fossil-fuel-driven energy consumption. Therefore, one way to tackle the global warming issue in the energy supply-demand equation will be to diversify the energy supply-side into non-fossil-fuel-driven "clean" energy sources like hydropower, wind, solar and biofuels. Demand for and investment in alternative energy sources is rising, mainly driven by society's changing perception of climate risk and intermittent, but inexhaustible, renewable energy sources. Political, environmental, social, technological and legal drivers include concerns over the future volatility of oil prices, security of the energy supply, the Kyoto Protocol, the EU Emissions Trading System (EU ETS) and various legislative support schemes (tariffs, investment subsidies, tradable green certificates), which encourage companies to reduce their GHG emissions.

Change coming to global warming policy in the USA

It is time the USA embraces an ambitious new approach by crafting a strategic energy policy to combat the problems of climate change, oil dependence and the developing world's lack of access to energy. Energy is fundamental to US domestic prosperity and national security. As one of the world's largest emitters of greenhouse gases, with the capacity to create and follow through on appropriate solutions, the USA can set an example by removing government subsidies for fossil fuels that are, to date, huge, hidden and uneconomical. Economically beneficial policies are being implemented to improve fuel efficiency in many areas, and preservation of the natural environment is becoming paramount. More important, regulation and "price signals" will stimulate development of technologies that can advance human well-being by lowering GHG emissions. Since 2005, leading American corporations like General Electric, UPS and Wal-Mart have pledged strong efforts to limit their emissions. Executives hope to improve public relations and avoid future lawsuits, and they do not want their companies to be caught off guard by emission regulations, suspecting their profits could tumble due to the effects of climate change. Powerful investors, from state pension funds to Wall Street firms like Goldman Sachs, are also beginning to weigh in global warming risks before investing in a company. We believe the USA is likely to follow the global trend toward tightening policies that constrain carbon emissions. Venture capital investors (VCs) and venture capital investments in US-based clean energy technology companies totaled almost USD 1 billion in 2004, with venture capital being fueled by future market projections (some of which estimate solar PV and wind power to grow into USD 40–50 billion markets by 2010–2014 [Earthscan]). As oil and natural gas prices continue to escalate, venture capitalists are investing millions in young companies researching ways to harness

Table 1 Source: Goldman Sachs, Renewables 2005: Global Status Report, Industrial Technology Research Institute (Taiwan), Energy Commission (Malaysia)

Clean energy incentives by country

Conventional power generation using coal or gas is often more cost-competitive than alternative energy; hence the latter needs to be either financially supported or mandated to stimulate installation.

Country	Feed-in tariff	Renewable portfolio standard	Tax reductions or credits	Public loans/ financing
China	●		●	●
Hong Kong				
India	● (1)	● (1)	●	●
Indonesia	●			
Korea	●		●	
Malaysia	●		●	
Philippines			●	●
Singapore			●	●
Taiwan	● (2)		●	●
Thailand	●	●		

Note (1): Many states have their own policies, but there is no overall national policy.
Note (2): Currently drafting legislation.

renewable technologies. A new era of green power has arrived, with alternative energy stocks surging dramatically. Mutual funds that invest in green energy achieved an average gain of 39% in the 12 months ended on May 3 (Bloomberg). The alternative energy bulls are indeed charging. What is needed to improve the alternative energy investment climate in the USA is national standards on renewable energy. We think this will occur in the next five years, regardless of which party controls Congress and the White House. If the Democrats gain in this fall's election, Congress could become incrementally more supportive of renewables. Several regional elections could also increase the number of renewable-friendly state executives. Table 2 gives a summary of key milestones in climate-change policy.

The USA, like Australia, has passed no binding national legislation to reduce GHG emissions. However, sufficient activity is now under way in the US Congress to warrant investor attention. The Regional Greenhouse Gas Initiative (RGGI) MOU was recently signed by the governors of the New England states to cap CO_2 from power plants. The US Energy Policy Act has also paved the way for government support of nuclear power, which was given cautious support from world leaders at the recent G-8 Summit. Other factors, including new markets opening up, growing environmental concerns, company savings via carbon credits, and less resistance from environmental lobby groups toward nuclear power and uranium mining have fueled popularity in alternative energy. Furthermore, the Pavley Plan bill in California, which caps CO_2 from cars, is being copied by a number of other states. We believe all these initiatives are setting the stage for firms to benefit from opportunities that address climate-change issues – especially the problem of greenhouse emissions. Examples of companies with exposure to these themes are Archer Daniels (NR[2]) – biofuels; Caterpillar (HOLD) – low-emission diesel engines, recycling; General Electric (BUY) – wind turbines, hybrid rail engines; Waste Mgmt (BUY) – landfill gases; Johnson Controls (NR[2]) – heating, ventilation and air-conditioning; Kinder Morgan (NR[2]) – CO_2 transportation; and Eaton (NR[2]) – hybrid diesel-electric truck power trains.

For exposure to the nuclear/uranium theme, we would highlight Cameco (BUY), Energy Resources of Australia (BUY) and BHP Billiton (BUY).

Clean energy initiatives promoted in Asia

Experience in Europe and the USA has shown that favorable government policies can be a strong catalyst for the development of alternative energy. Governments in Asia are implementing policies encouraging or mandating alternative energy investment. Coupled with strong economic growth and growing Asian environmental issues, we think the prospects for meaningful growth in alternative energy investment and manufacturing in the region are good. China and India, already among the world's top ten countries with regard to wind turbine systems installed, seem to have significant growth potential, and in most other places the outlook is promising – Korea stands out with its aggressive plans for photovoltaic (PV) cells. The Clean Development Mechanism (CDM) of the Kyoto Protocol for reducing GHG emissions, together with non-binding international partnerships like the Asia-Pacific Partnership for Clean Development and Climate (USA, Australia, China, India, Japan and Korea), could also fuel investments in Asia by providing an additional potential revenue stream that would further enhance project economics. In 2002, Japan adopted a "Special Measures Law Concerning the ↗

Table 2 Source: UNFCCC, AIP

Milestones in climate policy

The 1992 UN Framework Convention on Climate Change and the 1997 Kyoto Protocol are major milestones.

Year	Event
1979	First World Climate Conference.
1990	First Assessment Report of the IPCC; initial evidence that human activities might be affecting climate, but significant uncertainty.
	Second World Climate Conference; agreement to negotiate a "framework treaty."
1992	UNFCCC established at the UNCED (also known as the Earth Summit) in Rio de Janeiro, Brazil.
	Annex I developed countries pledge to return emissions to 1990 levels by 2000.
	United States ratifies UNFCCC later in the year.
1993	Clinton administration publishes its Climate Change Action Plan, a collection of largely voluntary emission-reduction programs.
	IPCC Second Assessment Report completed (published in 1996); stronger conviction expressed that human activities could be adversely affecting climate.
1995	Berlin Mandate developed at the first COP (COP1) to the UNFCCC.
	Agreement to negotiate legally binding targets and timetables to limit emissions in Annex I countries.
1997	COP3 held in Kyoto Japan, leading to the Kyoto Protocol.
	Annex I/Annex B countries agree to binding emission reductions averaging 5% below 1990 levels by 2008–12, with "flexibility mechanisms" (including emissions trading) for compliance; no commitments for emission limitation by developing countries.
	US Senate passes Byrd-Hagel resolution, 95 to 0, stating that the United States should accept no climate agreement that did not demand comparable sacrifices of all participants and calling for the administration to justify any proposed ratification of the Kyoto Protocol, with an analysis of benefits and costs.
1998	COP4 held in Buenos Aires, Argentina; emphasis on operationalizing the "flexibility mechanisms" of the Kyoto Protocol.
	IPCC Third Assessment begins.
1999	COP5 held in Bonn, Germany; continued emphasis on operationalizing the flexibility mechanisms.
2000	Global Climate Coalition dissolves, as many corporations grapple with the threat of warming, but oil lobby convinces the US administration to deny the problem.
2001	Third IPCC report states that global warming, unprecedented since end of the last ice age, is "very likely," with possible severe surprises.
	Bonn Meeting, with participation of most countries except the USA, develops mechanisms for working toward Kyoto targets.
2003	Deadly summer heatwave in Europe accelerates divergence between European and US public opinion.
2005	Kyoto Treaty goes into effect, signed by major industrial nations except the USA. Japan, Western Europe, and regional US entities accelerate work to impede emissions.
	Hurricane Katrina and other major tropical storms spur worldwide debate over the impact of global warming on storm intensity.

IPCCC = Intergovernmental Panel on Climate Change
UNFCCC = United Nations Framework Convention on Climate Change
UNCED = United Nations Conference on Environment and Development
COP = Conference of Parties

Use of New Energy by Electric Utilities," covering new energies including wind, solar, biomass, small hydro and geothermal. It is also noted that many Asian governments are starting to provide incentives for alternative energy **(see table 1)**.

China's renewable energy potential

China is both the world's second largest consumer of energy and the second biggest emitter of greenhouses gases, behind the USA. The International Energy Agency claims that, by 2020, China will be consuming more energy than the USA today, and its GHG emissions will have more than doubled. **Figure 4** shows China's renewable energy capacity, based on Credit Suisse Investment Banking estimates. In the 11th Five Year Plan (FYP), the Chinese government increased its commitment to promoting renewable energy by including two measures enhancing energy efficiency and promoting the use of renewable energy. The National Development and Reform Commission (NDRC) asserted that up to RMB 1.5 trillion (USD 184 billion) would be invested in renewable energy by 2020.

Feasibility and technology in China, Japan and Asia

We believe China's renewables sector is likely to display rapid growth in the areas of solar energy, wind power and biomass. However, there are also opportunities in the electricity sector, as China is estimated to require over 30 GW of new generating capacity every year to sustain its booming economy and growing population. Demand from the residential and service sectors continues to surge as living standards improve, with industry accounting for around 75% of electricity consumption. Combined heat and power (CHP) can make a major contribution to energy efficiency in China and help meet its soaring energy demand. This will create a huge potential market in China for foreign equipment manufacturers, system integrators and operators, as well as investors. But the opportunity is now, as major new hydroelectric power and other power schemes come on stream toward the end of the decade, and then the energy saving potential of CHP will no longer be an issue. Thus, the count of beneficiaries can be expanded to include both foreign and domestic electricity power generation companies. As China tackles its environmental woes, other potential beneficiaries will include Japanese providers of environmental services and equipment. The rationale is that Japan will be well positioned to provide China with the world-class expertise it needs, given that Japan faced a similar environmental pollution problem in the 1970s. Companies that can potentially benefit from new environmental regulations in China include Mitsui & Co. (BUY). As one of the largest trading firms in Japan, Mitsui & Co. trades GHG emission credits based on the Kyoto Protocol and captures business opportunities from CDM projects, which help developing countries fund technology transfers to reduce their GHG emissions. A number of Asian companies with renewable energy policies, technologies and solutions are also well positioned to benefit from the coming "renewable energy revolution," such as Shanghai Electric (BUY) – electricity/wind; Sharp (HOLD); Kyocera (BUY) – solar; Kuala Lumpur Kepong (HOLD) – biomass; Toyota Motor (BUY); and Honda Motor (HOLD) – hybrid cars. ■

Table 3 Source: EIA, IEA, IGA, AWEA

Leaders in renewable electricity

Iceland is a world leader in renewable energy, with over 99% of the country's electricity derived from renewable sources. A country's success rate of using renewables is based on geographical viability.

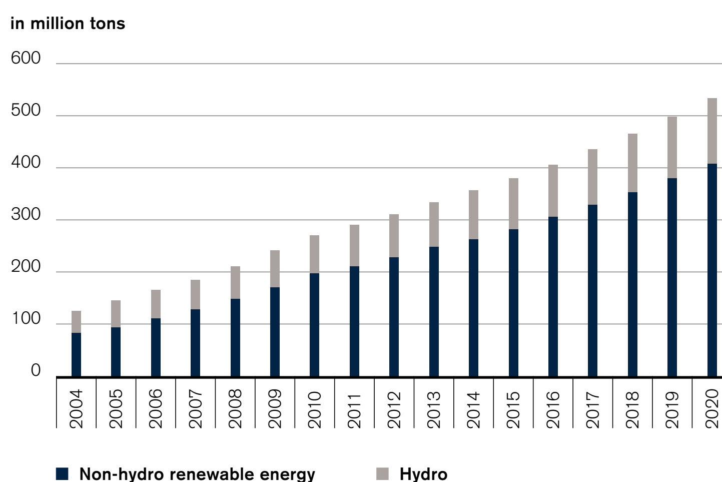
Hydro	Geothermal	Wind	PV Solar*
Canada	USA	Germany	Japan
USA	Philippines	USA	Germany
Brazil	Italy	Spain	USA
China	Mexico	Denmark	Australia
Russia	Indonesia	India	Netherlands

* 2004 figures

Figure 4 Source: NRDC, Credit Suisse estimates

Generation of renewable energy in China

China's renewable energy will reach 530 million tons of standard coal equivalent (mn tce) by 2020, according to CSIB estimates. Renewable energy is likely to be the next booming sector.



[1] Daniel Gilbert, "If only gay sex caused global warming", Los Angeles Times, July 2, 2006
[2] NR: non-rated. Note that we do not rate these stocks and make no recommendations on them as investments.

Diversification benefits of REITs

As investors become increasingly aware of risk, REITs are becoming attractive again. REITs have a relatively low correlation to bonds and equities and can thus enhance the risk-return characteristics of investment portfolios. Although rising interest rates have a negative impact on REITs, we still see upside potential for REITs, especially in those markets with strong fundamentals.

Zoltan Szelyes, Global Real Estate Analyst

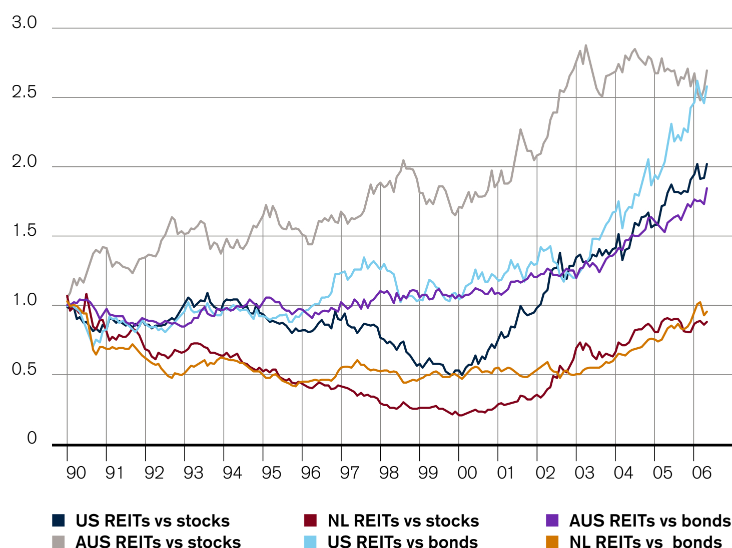
In recent years, Real Estate Investment Trusts (REITs) have enjoyed success around the globe. REITs have not only achieved strong returns in absolute terms, they have also outperformed the equity and fixed income markets in many countries. **Figure 1** illustrates the long-term evolution of REITs relative to local stocks and government bonds in the USA, Australia and the Netherlands. For Australia and the USA, we can see quite a strong outperformance of REITs versus equities and bonds since 1990. For the USA, a dollar invested in bonds in 1990 has tripled in value and a dollar invested in equities has quadrupled. Invested in REITs, however, the same dollar is now worth nearly eight times as much.

All in all, this analysis shows that REITs have been established as a good alternative to the other two traditional asset classes. As a consequence of their popularity, REITs were also introduced in Japan (in 2001), Singapore (2002) and France (2003). We expect REITs to spread further around the globe. The UK has introduced REIT legislation that opens the way for UK REITs from 2007 onward. The discussion about introducing REITs has also intensified in Germany. The potential for the growth of Germany's publicly quoted real estate sector is not only reflected in the growing attraction of the real estate market, but also by structural issues. On the one hand, a large amount of real estate stock is still in the possession of non-real-estate-related companies or public institutions in Germany that would like to generate additional cash by selling their real estate portfolios. On the other hand, the listed sector is still very small. The amount of real estate in the possession of German real estate companies is only about half a percent of commercial real estate stock. This is quite a low value by international comparison. The average is around 3% in Europe and around 10% in the USA and Asia.

Figure 1 Source: Global Property Research, Bloomberg, Credit Suisse

REIT performance vs. stocks and bonds

REITs have outperformed stocks and bonds in Australia and the USA since 1990. In the Netherlands, they have generated around the same returns as local stocks and bonds in the same period.



Favorable correlation properties

Besides the general favorable outlook, REITs are attractive for investors due to their portfolio-optimizing characteristics. The benefits of a well-diversified portfolio were brought back to investors' attention in light of the increased financial market volatility this summer. As asset prices came under pressure on the back of increased inflation risks and uncertainties about rate hikes, REITs performed quite well relative to other asset classes. REITs' defensive investment strategy and their relatively high income yields have provided a cushion in times of increased risk. In addition, the inflation indexation of rents is likely to have supported prices of REITs. In most countries, leases for both office and retail properties are inflation indexed and thus offer investors inflation protection.

Due to their favorable portfolio-optimizing characteristics, REITs should be considered for inclusion in portfolios. The main advantage is a lower correlation to shares and bonds. Put more simply, REIT prices do not always move in tandem with the movements of other asset classes. True, they sometimes move in the same direction, but often not as strongly and at times even move in the opposite direction of other asset classes. As the diversification potential of REITs can vary strongly depending on the market environment, we have taken a look at the correlation between REITs and equities as well as bonds in various countries. **Table 1** shows our

Table 1 Source: Credit Suisse

REITs, equities and bonds

Correlations currently vary across different countries. The strongest correlation to equities is in the USA, and the strongest correlation to bond yields is in the USA, Australia and Canada.

	Yields on 10-year bonds	Equity markets
USA	–	++
Netherlands	0	+
France	0	+
Japan	0	0
Australia	–	0
Canada	–	0

++ = correlation coefficient higher than 0.5, + = correlation coefficient 0.5 to 0.2, 0 = correlation coefficient 0.2 to –0.2, – = correlation coefficient –0.2 to –0.4.

results for various countries. REITs in Canada, Japan and Australia currently exhibit the most favorable portfolio optimization properties relative to equities.

Interest rate risk lower if fundamentals are sound

As **table 1** also shows, the correlations between REITs and bonds are currently between 0 and –0.4. European and Japanese REITs currently exhibit the lowest correlation to bonds. In theory, one expects to see a negative correlation between real estate and bond yields, as higher interest rates not only make real estate less attractive than risk-free assets, but also worsen the conditions for financing real estate investments. As **figure 2** shows, the correlations to bond yields are not rigid, but rather subject to strong fluctuations. The drivers behind these yields include the fundamental underlying development of the real estate markets and the yield differentials between property and bond yields. Between 2001 and 2003, property yields were relatively high and prices low, which meant that changes in interest rates had a lower impact on the movements of REIT prices. As purchase prices rose, however, property yields sank. The upshot was that the yield differentials between real estate and bonds narrowed. Consequently, interest rates now play a greater role in the investment decision-making process and might make REITs less attractive compared with risk-free assets. In such an environment, the negative correlation between REITs and bond yields has become stronger. However, greater certainty with respect to the recovery of the rental markets, for instance in the USA, Europe and Japan, has weakened the correlation since the start of this year. The prospects of declining vacancies and rising rents form a counterweight to rising interest rates as companies' expected streams of income are likely to strengthen. Hence, higher streams of income partly offset the negative effects of higher interest rates.

This means that, even with rising interest rates, REITs may remain attractive if the outlook for the underlying real estate markets is promising and the differentials between real estate returns and bond yields are comfortable. In this vein, European and Japanese REITs are likely to continue to show the best performance in an environment of rising interest rates, as they exhibit the best yield differentials, and we believe there will be a marked rise in rents.

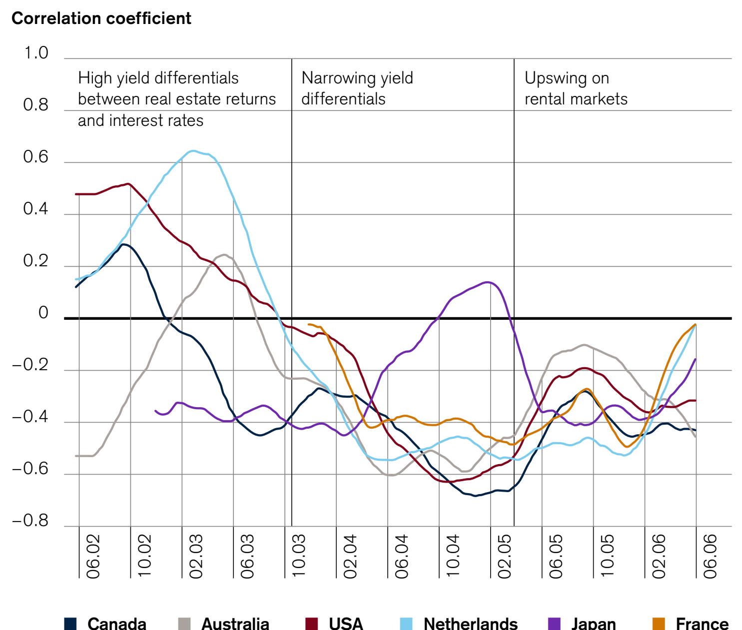
Outlook: Still more upside for REITs

REITs' relative properties with respect to equities and bonds warrant their strategic inclusion in investment portfolios. They offer investors relatively high dividend yields and exhibit a strong portfolio diversification potential. While higher interest rates pose a risk for REIT prices, sound market fundamentals can outweigh the negative impact caused by the higher interest rates. Although valuations in a number of markets are already higher than was the case several years ago, REITs clearly have upside potential, in our view. Particularly in Europe, REITs should benefit from the continued positive performance of the commercial real estate markets. Furthermore, in our view, valuations in Europe are not exaggerated either. Looking ahead, REITs are trading at a discount to their expected NAV at year-end 2007, and we think they have further upside potential. ■

Figure 2 Source: Global Property Research, Bloomberg, Credit Suisse

Factors driving correlation

The correlation between REIT yields and bonds yields varies depending on the market environment.

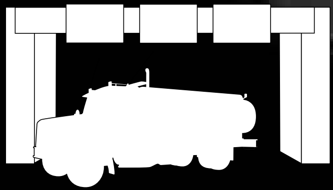


154 cable-stays (11 pairs per pylon arranged in a single monoaxial layer),
342 m width of each span, 900 t tension for the longest ones

32 m width

7 piers, 343 m maximum height (20 m higher than the Eiffel Tower)

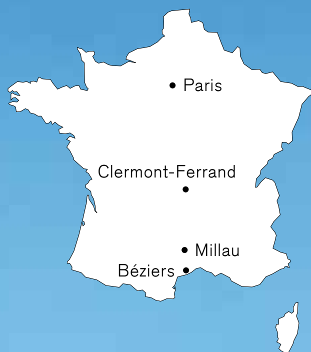
245 m height of the tallest pier



A new north-south corridor

With the Millau Viaduct, the A75 motorway is now the shortest and most economical route linking the north and the south not only of France, but also of Europe. Four kilometers from the Millau Viaduct, on the Red Limestone Plateau, the operations buildings are next to the toll barrier. These buildings are the nerve center of the whole organization. A control tower enables round-the-clock surveillance of the traffic on the bridge. Information provided by the dozens of sensors positioned in the piers, the deck, the pylons and the stays is all centralized here.

Photo: Jean-Philippe Arles/Reuters/Corbis



Architect:	Norman Foster
Constructor:	Eiffage Group
Weight of the steel deck:	36,000 t, i.e. 4 times the Eiffel Tower
Volume of concrete:	85,000 m³, i.e. 206,000 t
Cost of construction:	approximately EUR 400 million
Length of the concession:	78 years – 3 years of construction and 75 years of operation
Structure guaranteed:	120 years

Source: www.leviaducdemillau.com

The pylons are 87 m high

2,460 m length, 3.015% slope, rising north-south in the direction Clermont-Ferrand–Béziers

20 km curvature

Public-private partnerships on the rise

Public-private partnerships (PPP) are driving infrastructure project growth and helping government budgets. Private sector involvement in infrastructure development and refinancing has become a proven concept due to efficiency gains and more precise project planning in terms of time schedules and costs.

Thomas Rauch, Equity Strategy & Equity Sector Analyst, **Dr. Jeremy James Field,** Research Analyst Fixed Income

According to Standard & Poor's definition, a public-private partnership (PPP) or private finance initiative (PFI) is any medium- to long-term relationship between the public and the private sector involving the sharing of risks and rewards of multisector skills, expertise and finance to deliver desired policy outcomes.

Standard & Poor's PPP, Credit Survey 2005

The success of private sector involvement in infrastructure development and refinancing has been proven in countries such as Australia, Canada and the UK. The independent National Audit Office in the UK has found that privately financed and operated infrastructure shows 10%–25% efficiency gains versus publicly financed projects, which underpins the considerable advantages. Aging infrastructure, scarcity of governmental funding and the aforementioned efficiency gains are the key growth drivers of public-private partnerships in mature markets. In theory, infrastructure investments are direct and indirect investments in businesses that own and/or operate the physical structure and networks used to provide essential public services. Based on the definitions above, PPPs and PFIs offer a huge variety of collaboration between the private sector and public institutions. There is by no means any form of fixed contract or finance structure that makes a standard model possible. The most common point for all such contracts is acquiring access to financial markets for public projects that are transformed accordingly, so that investors can directly participate in the success of the specific project that delivers higher returns than government bonds. Simultaneously, the project and operating structure guarantees obtaining the best expertise in the relevant industry.

Transport sector has the longest PPP history

Initially, many countries developed PPPs in the transport sector (tunnels, bridges, roads), followed by the water and wastewater, health and education sectors. The reason for this evolution lies primarily in the huge costs in building up the transport infrastructure. The overall aim even then was to take advantage of private sector finance and skills to deliver much needed social infrastructure. The sector distribution of the PPP portfolio of the European Investment Bank **(see figure 1)** adequately reflects this situation.

Sustained investment in infrastructure – especially transport infrastructure – is vital if Europe is to maintain its competitiveness against rapidly growing emerging economies.

Rt Hon Alistair Darling MP, UK Secretary of State for Transport at the 2005 PPP Transport Summit

According to Dealogic ProjectWare, during 2004 and 2005, 206 PPP deals worth approximately USD 52 billion were closed worldwide. Among these 206 projects, only 54 were outside Europe, which clearly points towards the importance of this growing market in the Old World. Although there were clearly fewer projects outside Europe, the estimated value of the investments outside Europe, at approximately USD 26 billion, is nearly at the same level. In the period between 1994 and 2005, PPP deals worth around USD 120 billion were closed in Europe, two-thirds of which were in the UK, followed by Portugal and Spain, each accounting for 9%–10% **(see also figure 2)**.

Millau Viaduct France

The Millau Viaduct (French: le Viaduc de Millau) is a cable-stayed road bridge that spans the valley of the river Tarn near Millau in southern France, and is a key step for the completion of the French highway system. French bridge engineer Michel Virlogeux designed the bridge in collaboration with British architect Norman Foster. The ambitious project is the tallest vehicular bridge in the world, with one pier's summit at 343 meters – slightly higher than the Eiffel Tower, and only 38 meters shorter than the Empire State Building. It was opened for traffic on 16 December 2004 ahead of the original

Figure 1 Source: European Investment Bank, PPP for Infrastructure in the EU (EAPA Symposium 2006, Brussels)

EIB portfolio by sector

The sector distribution of the PPP portfolio of the European Investment Bank reflects the importance of PPP structures in the transport sector.

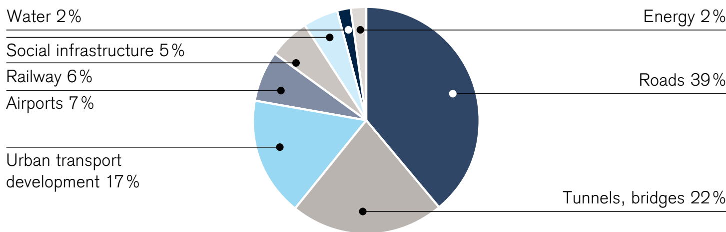


Figure 2 Source: Dealogic ProjectWare

Average 2000–2005 PPP activity as a % of mean GDP

The greatest number of PPP deals were closed in the UK; nevertheless, broken down by percentage of GDP, Portugal, the UK, Ireland and Hungary led the way.

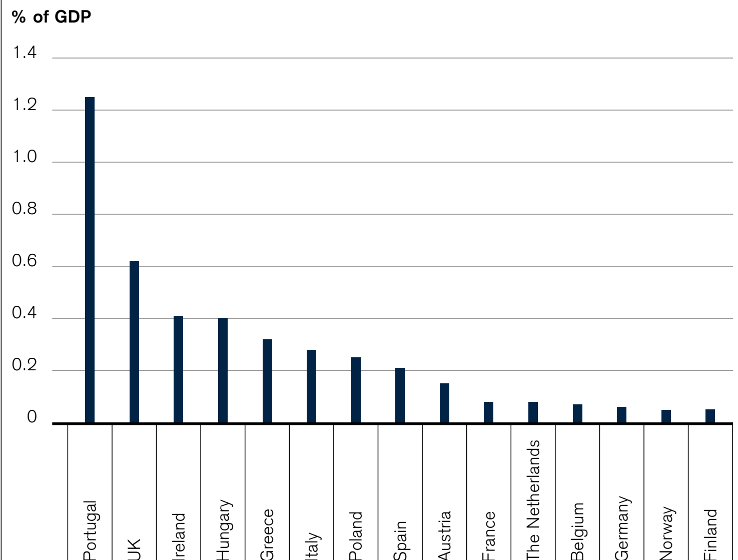


Table 1 Source: Credit Suisse

Examples in the transport sector

Name	Place	Completion	Project costs	Length
Øresund bridge	Copenhagen to Malmö	July 2000	EUR 2 bn	7,845 m
Vasco da Gama bridge	Lisbon	March 1998	EUR 1 bn	17,000 m
Alameda Corridor rail route	California, Los Angeles	April 2002	USD 2.43 bn	20 miles
Dulles Greenway toll road	Washington to Leesburg (Virginia)	September 1995	USD 350 m	22.5 km or 14.5 miles

Figure 3 Source: HM Treasury, UK Government

Infrastructure projects in the UK

As can be seen by the large number of realized projects, private sector involvement in infrastructure development and refinancing has been a success story in the UK.

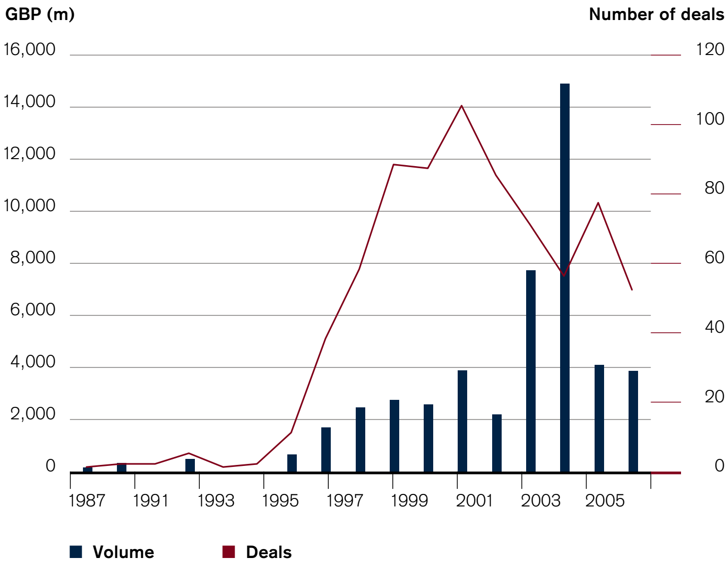


Figure 4 Source: Credit Suisse

Corporate bonds

There are only few long-dated or inflation-linked corporate bonds; investors get only little reward for taking long-term credit risk.

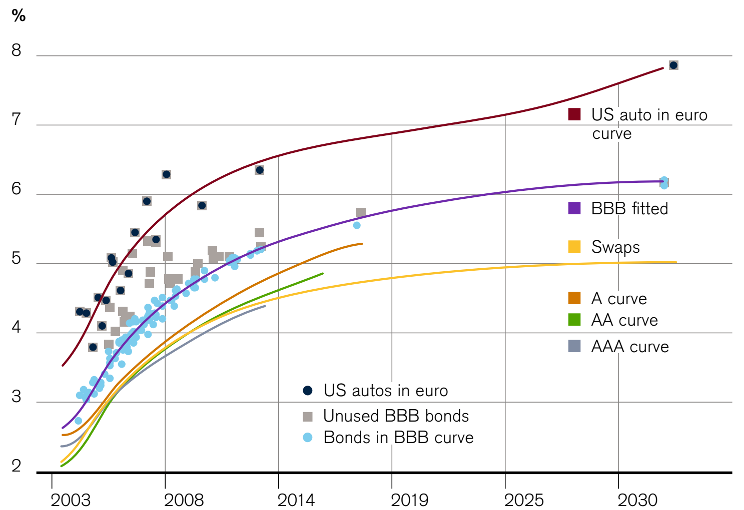


Figure 5 Source: DB Global Markets Research, Credit Suisse

Pension industry requirements

Euro Zone: mismatch between supply and demand of inflation assets.

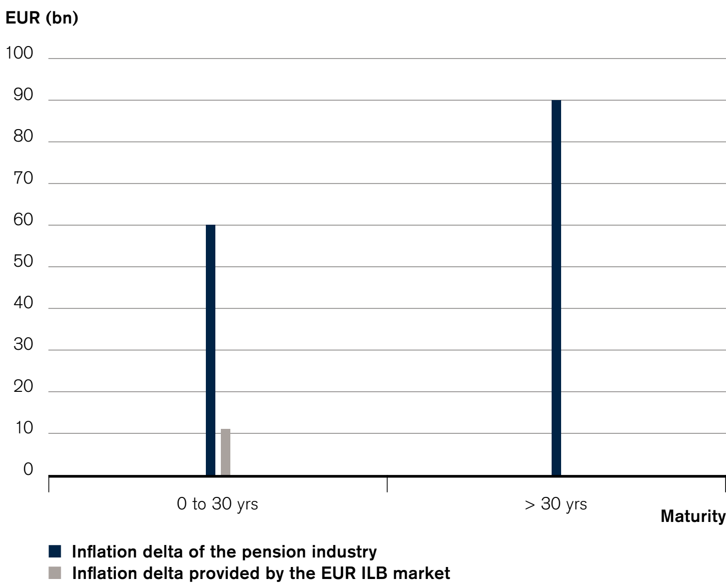
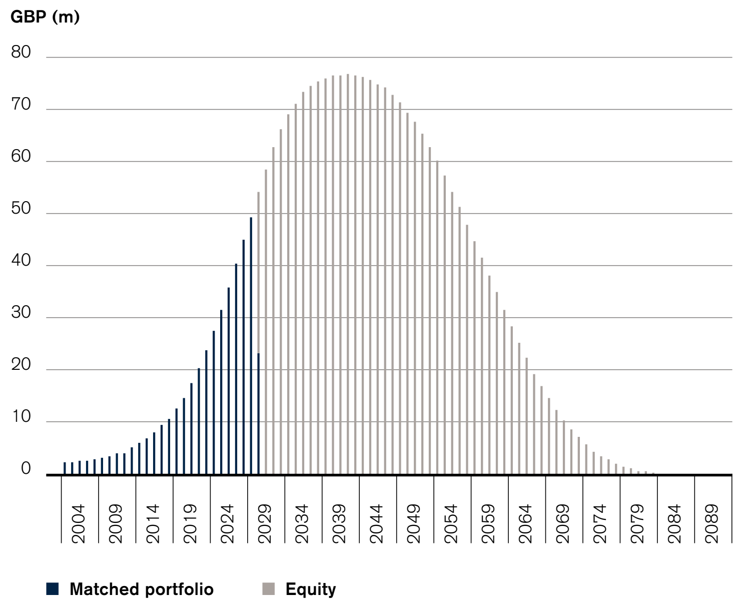


Figure 6 Source: Credit Suisse

Portfolio structure

Matched portfolio for 20–25 years, then equity?



time schedule, and the project experienced no problems during construction or with respect to the financing plan, such as cost overruns. The huge Millau Viaduct illustrates perfectly how the public sector can benefit from private sector knowledge and financing.

Types of infrastructure

Infrastructure is normally divided in two categories, "social infrastructure" and "economic infrastructure." The key difference between the two categories is that users are prepared to pay for the economic infrastructure (transport, utilities, communications), while across Europe, the situation is quite different with respect to the willingness to pay for social infrastructure (typically schools, healthcare). In a pan-European context, the public sector at present provides the infrastructure and the related services, whereas in the Anglo-Saxon PFI or PPP model, social infrastructure consists mainly of partnerships between the public and the private sectors, under which the private sector provides the physical assets.

The worldwide current infrastructure project boom has various reasons, and, particularly on the demand side, we have to distinguish in a global context between the worldwide regions according to their stage of development. The dynamics of infrastructure investments clearly differ between emerging and developed markets: in emerging markets, the main drivers are urbanization and the building of new infrastructure to serve a wealthier population, while developed markets' infrastructure projects comprise mainly replacements and improvements of existing infrastructure.

Worldwide differences in the infrastructure boom

Emerging markets: The dramatic urbanization figures in emerging markets (especially in Asia) show that infrastructure needs there differ significantly from those in developed markets. Globally, it is estimated that one million people move to cities per week, creating a vast demand for new energy, transport and water facilities. Demand is currently being further boosted by the underinvestment that followed the Asian crisis in 1997–98. As incomes rise, people in cities around the world are increasingly asking for western-style state-of-the-art infrastructure, and the strong economic growth of many countries allows them to undertake the requested projects.

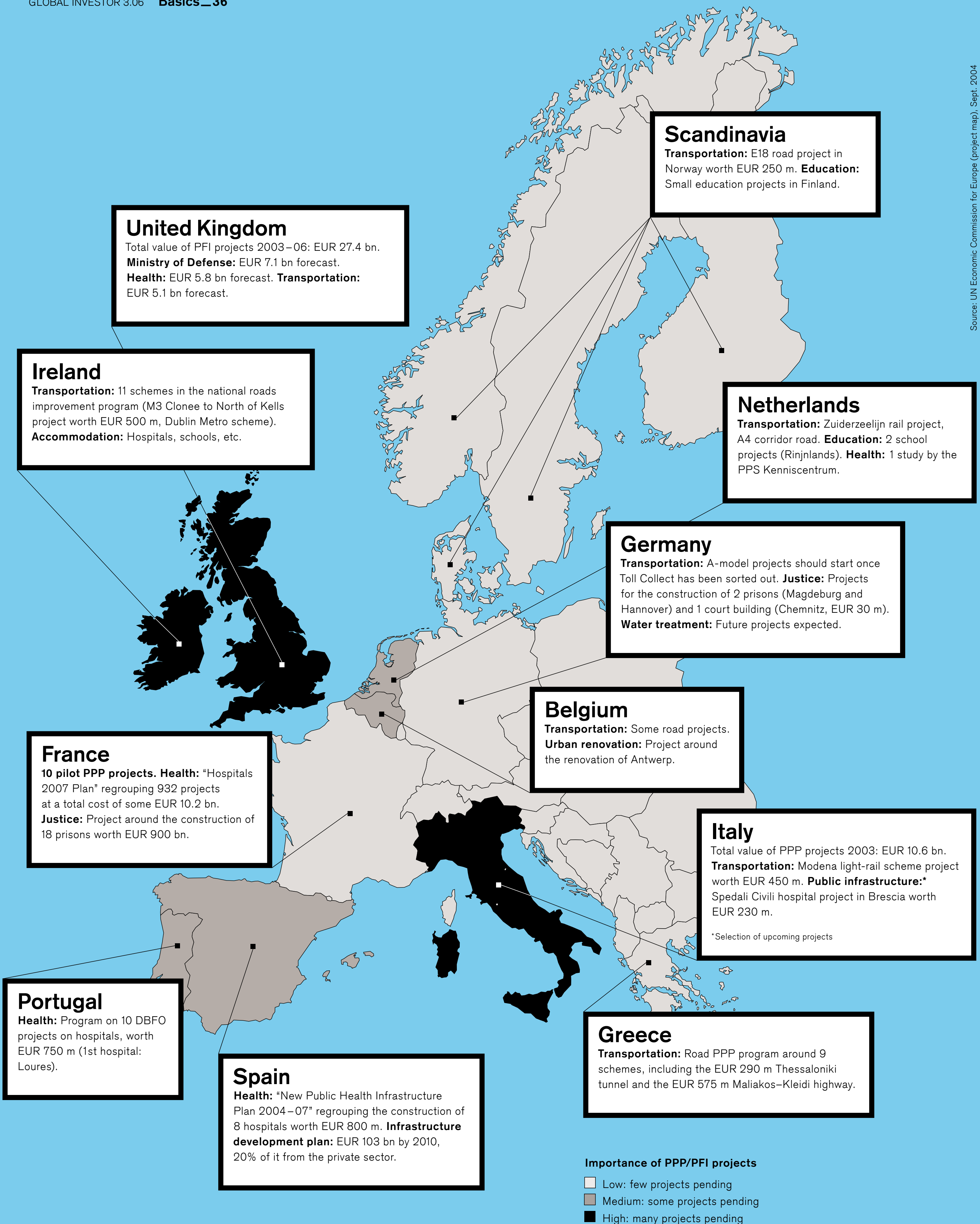
Developed markets: The rise of global competition among cities and countries for taxpayers, businesses and corporate headquarters has been a potent driver for infrastructure projects in developed markets: easy commuting, fast international connections and state-of-the-art infrastructure facilities are key to attract business and improve quality of life (as several surveys issued by HR consultants suggest). Much of the existing infrastructure is very old (e.g. the London Underground was first opened in 1863, the Paris Métro in 1900), and was planned for fewer users and completely different habits and lifestyles. To finance the works, governments are using various methods, including PPPs.

What drives PPP structure growth?

Budgetary pressure (fulfillment of Maastricht criteria), aging infrastructure and increased pressure for different ambitious large-scale European Community projects force pan-European countries to follow the UK route. The UK has been at the forefront of such projects since 1987 and the project volume by value peaked during the period between 2002 and 2004. The signed project list to date contains 749 projects with a capital value of GBP 46.4 billion invested in infrastructure projects (source: UK, National Audit Office, 2006).

PPPs are long-term partnerships to deliver assets and services underpinning public services and community outcomes. Optimal structuring links private sector profitability to sustained performance over the long term, yielding robust and attractive cash flows for investors in return for delivering better value for money to the taxpayer.

John Laing plc, *The EC Green Paper on PPPs and concessions*. John Laing plc specializes in infrastructure development, investment, and operations. The group invests in, develops, and operates hospitals, schools, defense establishments, police stations and roads in the private finance initiative (PFI) and public-private partnership (PPP) markets. John Laing also runs a United Kingdom train operating company (Chiltern Railways).



PPP market trends and major players

PFI/PPP development trends per country and sector. This is a selection of upcoming projects. The UK, Ireland and Italy should be the most dynamic countries in the near future, while transportation, health and public infrastructure should be the most dynamic sectors.

Across Europe, we can readily find a number of transactions, which have already been implemented by numerous governments, as well as plans and intentions for more in future. The French state, for instance, quite recently disposed of its stakes in companies that operate a network of toll roads. Even though the sale of these assets has nothing to do with a PPP project, it doubtlessly shows that governments are forced to reduce public expenditure. The Spanish Ministry of Public Works and Development's 10-year strategic plan foresees the financing of around 40% of total investments of around EUR 250 billion through public-private partnerships. In Germany, the government is currently evaluating formal, functional and material aspects of a privatization of the national highway network. The estimated value of the national highway system is approximately EUR 172 billion (source: Alfen Consult GmbH, Studie zur Privatisierung des deutschen Autobahnnetzes, formell, funktional oder materiell). The sale of the road network itself is not a PPP, but the requirements for maintenance and extension would be structured accordingly, clearly pointing towards the potential of this market. In addition, more and more EU member state governments are establishing PPP units centrally or within individual ministries (e.g. ministry of finance). This points clearly to the fact that institutional support for PPPs is growing among European governments and that they are considered to be a pivotal initiative in the future.

PPPs make additional projects affordable. By attracting private sector finance for schemes suited to the PPP model, limited public sector funds can be directed to deliver other non-PPP projects.

Julie O'Neill, Secretary General of the Irish Department of Transport at the 2005 PPP Transport Summit

Countries need to radically improve and modernize their transport networks, but often lack budgetary resources and administrative structures to traditionally design and then procure the infrastructure they need. Even when EU funds are available, it makes sense to get the maximum leverage on those funds through project finance to postpone the budgetary impact of capital expenditure.

David Azema, CEO Vinci Concessions, at the 2005 PPP Transport Summit

PPP: Investors focus on this new asset class

The rationale for the development of infrastructure as an asset class is embedded in the classical supply/demand relationship. As the portfolio of PPP projects expands, the financial markets become increasingly comfortable and educated regarding the characteristics of such transactions, a fact which has brought PPP projects more widespread recognition as a separate asset class with stable return characteristics and an attractive risk/reward profile. In comparison with alternative investments in a similar risk category, the projects are providing longer duration and relatively higher yields, and are a suitable investment for investors targeting these asset characteristics. Externally, the new asset class has been supported by significant market liquidity, coupled with the fall in long-term government bonds that helped to drive up the value of these investments. Very few corporate bonds have a maturity beyond 10 years and offer little reward for taking long-term credit risk **(see figure 4)**, whereas infrastructure projects typically have a long lifespan (toll roads, bridges, tunnels, utilities), coupled with secure cash flows. The quite recent inflow of new money for existing and new projects from equity funds targeting stakes in such projects will remain sustainable, in our view. Institutional investors such as pension funds, which seek to match their long-term pension liabilities with long-dated and stable income flows offered by this kind of assets, represent one driver that will guarantee continued development in this area. Only a small fraction of these long-term liabilities can be matched with inflation-linked bonds **(see figure 5)**. PPP investments offer pension funds the possibility to match their contingent liabilities with longer duration assets.

All of the aforementioned factors and the environment in the financial markets have contributed to a sustained appetite in the primary markets. Market participants are keen to fund new projects, especially in an environment with increasing volatility in equity markets. Demand for some asset classes clearly exceeds the current supply. The growing popularity of this asset class now presents the opportunity for a more vibrant secondary market, as the asset class matures and grants easier access to private investors. The number of European and global infrastructure funds has more than doubled in the last 18 months according to Standard & Poor's. Additionally, Macquarie Bank Ltd., ABN AMRO Bank N.V. and Allianz AG have recently established funds. For investors who wish to buy infrastructure securities directly, companies like e.g. Albertis Infrastructure SA (S&P: A, Moody's: n.r., Fitch: A), Red Electrica (AA-, A2, n.r.), E.ON (AA-, Aa3, AA) offer the possibility to buy both equity and bonds, while Cintra and Grupo Ferrovial SA are both purely financed with bank loans and are therefore pure equity plays. Bonds of these infrastructure project providers are mostly of good investment grade quality and offer an alternative credit spread over government bonds, and give investors such as pension funds the possibility to match their liabilities for periods up to 20–25 years. Thereafter, they have to match with equity as shown in **figure 6**. ■

European public sector bond issuers

The European public sector offers very high (AAA) credit quality bonds. Besides EUR, GBP and USD, issuers regularly bring bonds in the currencies of all other industrialized countries to the market. In recent years, many major issuers have also issued bonds in emerging market currencies, allowing investors to play medium-term currency trends without taking credit risk. Despite top-quality ratings, public sector bonds offer attractive yield pickups over government bonds.

Dr. Jeremy James Field, Research Analyst Fixed Income

The European public sector for bond issuance is large in size and diversified in nature. **Figure 1** shows that several European agencies have more bonds outstanding, by value, than a sovereign issuer like Switzerland, for example. Institutions that have either a public sector mission or policy role characterize the sector. The bonds generally benefit from explicit or implicit guarantees at either the sovereign or sub-sovereign level. The guarantees mean that the credit quality of the issuers' debt is very high, usually equal to that of the sovereign or sub-sovereign providing the guarantee. **Table 1** shows some of the largest European public sector issuers by country or region, together with their credit ratings. The largest issuers in the sector are typically development and special purpose banks, the biggest being the European Investment Bank (EIB), which is a multilateral development bank, and the Kreditanstalt für Wiederaufbau (KfW) (explicit government guarantee) of Germany. Many of these development banks were set up to finance the rebuilding of Europe after World War II, like KfW, or are the result of European integration, like EIB. Institutions specializing in refinancing government obligations are also significant bond issuers. The two largest are Caisse d'Amortissement de la Dette Sociale (CADES) (explicit government guarantee), which refinances and amortizes French social security debt, and German Postal Pension Securitization (GPPS), which securitizes receivables stemming from pensions payable to employees with civil servant status of the privatized successor companies to the German Federal PTT. State infrastructure funding, particularly the financing of the rail sector, is another area with large bond issuance. For example, Réseau Ferré de France (RESFER) owns the French railway infrastructure, while ASFiNAG (explicit government guarantee) of Austria finances the country's motorway and highway infrastructure. Export financing agencies also represent another group with significant bond issuance. Eksportfinans (EXPT) is the leading credit institution in Norway and the country's largest international borrower. It exercises a legal monopoly in providing government-supported export finance, and also makes loans to local government in Norway. The Österreichische Kontrollbank (OKB) (explicit government guarantee) acts as an agent of the Republic of Austria, administering export guarantees and offering export credits.

The EIB as an example

The sovereign governments of industrialized countries issue most of their debt in their local currency, and some sovereign issuers like the USA, France, Japan and Switzerland have no foreign currency debt. In contrast, European public sector institutions issue debt in

↗

Figure 1 Source: Credit Suisse, Bloomberg

Value of bonds outstanding by issuer

Some large public sector issuers have more debt outstanding than a sovereign issuer like Switzerland.

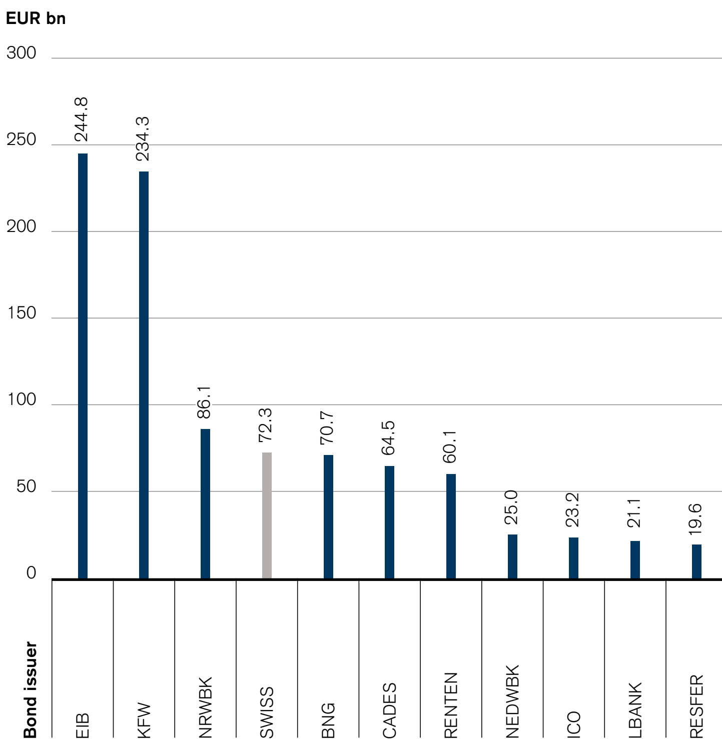


Figure 2 Source: Barclays, dealogic

Currency distribution of public sector bond issuance

There has been a trend among European public sector bond issuers to issue more debt in other, non-core currencies, including those of emerging markets.

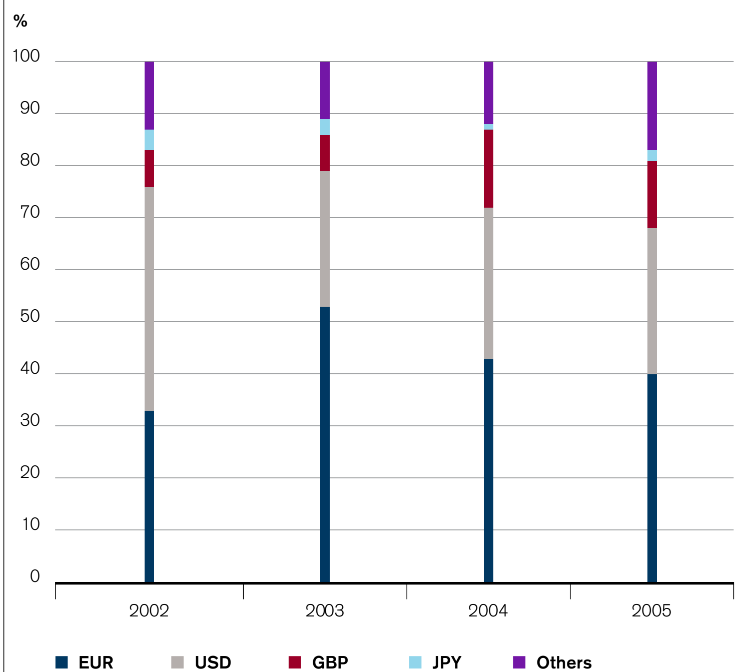


Figure 3 Source: Credit Suisse, EIB

EIB's outstanding debt by currency

The EIB is a major issuer in EUR, GBP and USD, as well as other currencies, with an annual gross issuance of over EUR 50 bn.

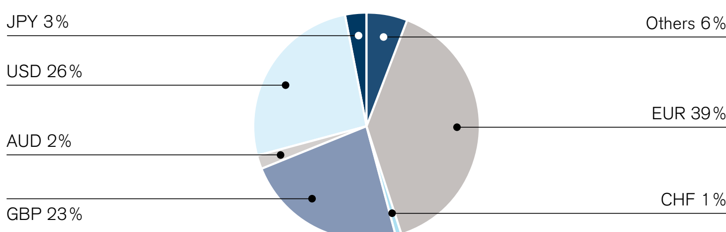
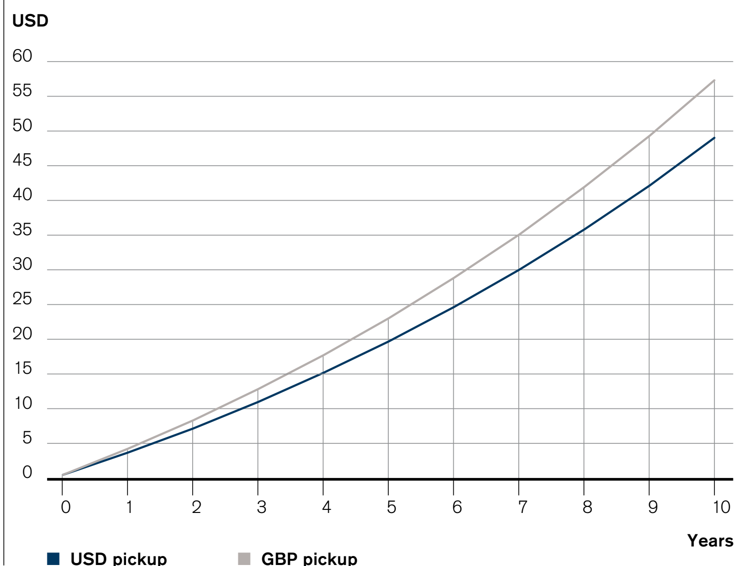


Figure 4 Source: Credit Suisse, Bloomberg

EIB 10Y USD bond yield vs. UK and US government bonds

Additional return of investing 1,000 (GBP/USD) in EIB bonds, assuming that the coupons are reinvested at the yield-to-maturity. GBP converted into USD to simplify the comparison.



a variety of currencies, as figure 2 shows. European public sector bond issuers typically seek to optimize their financing costs and diversify their investor base. One clear trend in the currency distribution in figure 2 is the increase in "other" currencies. The issuer in the sector with the largest number of bonds outstanding by value is the European Investment Bank, EIB, with EUR 245 billion, followed by Kreditanstalt für Wiederaufbau, KfW, with EUR 234 billion. In 2005 the EIB raised EUR 49.8 billion via 330 transactions in 15 different currencies, with 88% in the bank's three core currencies: euro (EUR), pound sterling (GBP) and US dollar (USD). The EIB's stated objective is to issue 85% to 90% of its debt in its core currencies. The remaining 12% of EIB's 2005 issuance involved 12 different currencies. The EIB's 2006 funding program is expected to be in the range of EUR 50 to 55 billion, with a similar volume of issuance from KfW. For comparison, the Swiss government is expected to issue CHF 6.5 billion (EUR 4.2 billion) of debt in 2006. The EIB delivers benchmark liquidity across its three core currencies and is the sole issuer to offer such comprehensive yield curves across EUR, GBP and USD. In 2005 the EIB raised EUR 19.3 billion in the EUR market and is the only borrower that complements sovereign issuers with benchmark issues in a global format with a size of up to EUR 5 billion and outstanding maturities ranging from 3 years to 30 years. It has an aggregate amount of EUR 62 billion of bonds outstanding in EUR. In the non-benchmark EUR segment EIB saw a dramatic increase in demand from European investors for yield-enhancing interest-rate-structured transactions in 2005 and raised EUR 7.6 billion, up over 100% versus 2004, and this trend is likely to continue. In 2005 the EIB raised USD 18.3 billion in USD debt capital markets, making it the largest non-US issuer in USD in the international markets. In 2005 the EIB issued five USD global benchmark issues, including three USD 3 billion issues, as well as two Eurodollar bonds totalling USD 2.25 billion. EIB's structured US dollar transactions in 2005 amounted to USD 2.9 billion. The EIB is the leading frequent issuer in the GBP market, after the UK government (Gilts), raising GBP 6.9 billion (EUR 10.0 billion) in 2005. The EIB's bonds are the main alternative to UK Gilts and act as the benchmark for the non-Gilt market, with around GBP 42 billion of bonds outstanding. In 2005 the EIB brought 11 benchmark issues to the sterling market, demonstrating its consistent approach to maintaining a GBP yield curve, which includes a 50-year maturity issue. Figure 3 shows the currency breakdown of EIB's outstanding debt by major currencies.

Trend towards currency diversification

The increasing trend to issue bonds in non-core currencies, as shown in figure 2, can be broadly segmented into five groups: 1) the Japanese yen (JPY) is the single most important currency and is particularly used by issuers like Eksportfinans (EXPT) and KfW for private placement in Japan; 2) the currencies of new EU member states and accession countries, which includes the Hungarian for-

Table 1 — Source: Credit Suisse, Bloomberg

Some leading European public sector bond issuers compared to the Swiss government

Major public sector issuers, ranked by amount of debt outstanding, with the Swiss Federal Government as a comparison.

Name of issuer	Country/region	BB ticker	Scope	Bonds outstanding (EUR bn)	Credit ratings S&P	Moody's	Fitch
European Investment Bank	European Union	EIB	Development bank	244.8	AAA	Aaa	AAA
Kreditanstalt für Wiederaufbau	Germany	KFW	Development bank	234.3	AAA	Aaa	AAA
NRW.BANK	Germany	NRWBK	Development bank	86.1	AA-	Aa2	AAA
Swiss Government	**Switzerland**	**SWISS**	**Government**	**72.3**	**AAA**	**Aaa**	**AAA**
Bank Nederlandse Gemeenten	Netherlands	BNG	Public sector bank	70.7	AAA	Aaa	AAA
Caisse d'amort. de la dette sociale	France	CADES	Government agency	64.5	AAA	Aaa	AAA
Landwirtschaftliche Rentenbank	Germany	RENTEN	Development bank	60.1	AAA	Aaa	AAA
Svensk Exportkredit AB	Sweden	SEK	Export finance	23.0	AA+	Aa1	NR
Nederlandse Waterschapsbank	Netherlands	NEDWBK	Public sector bank	25.0	AAA	Aaa	AAA
Instituto Credito Oficial	Spain	ICO	Development bank	23.2	AAA	Aaa	AAA
L-Bank Foerderbank	Germany	LBANK	Development bank	21.1	AA+	Aaa	AAA
Réseau Ferré de France	France	RESFER	Railway infrastructure	19.6	AAA	Aaa	AAA
Eksportfinans A/S	Norway	EXPT	Export finance	17.8	AA+	Aaa	AAA
Österreichische Kontrollbank	Austria	OKB	Export finance	15.7	AAA	Aaa	NR
German Postal Pensions	Germany	GPPS	Special purpose entity	15.5	AAA	Aaa	AAA
SNCF	France	SNCF	Railway operator	15.0	AAA	Aaa	AAA
Nordic Investment Bank	Scandinavia	NIB	Development bank	13.6	AAA	Aaa	NR
Council of Europe	38 European countries	COE	Development bank	13.3	AAA	Aaa	AAA
Network Rail Infrastructure	Great Britain	UKRAIL	Railway infrastructure	13.2	AAA	Aaa	AAA
Kommuninvest	Sweden	KOMINS	Public sector bank	6.0	AAA	Aaa	NR
ASFiNAG	Austria	ASFING	Road infrastructure	5.7	AAA	Aaa	AAA

int (HUF), Polish zloty (PLN) and the Turkish lira (TRY); 3) commodity-sensitive currencies: Australian dollar (AUD), Canadian dollar (CAD), New Zealand dollar (NZD) and South African rand (ZAR); 4) other European currencies: Swedish krona (SEK), Norwegian krone (NOK), Swiss franc (CHF) and Iceland krona (ISK); 5) emerging market currencies including: Brazilian real (BRL), Chinese renminbi (CNY), Malaysian ringgit (MYR), Mexican peso (MXN) and Russian rouble (RUB). These other currency issues provide investors with high-grade credit plays on medium-term currency trends and, particularly with emerging market currencies, provide a credit quality which local issuers are unable to match. For example short-dated local currency bonds in BRL, besides providing a yield of around 13%, have also benefited from a currency appreciation against the USD of around 13% over the last 18 months. We plan to update such recommendations in our regular publications in the future. However, investors need to be aware that emerging market currencies can be very volatile, recent examples in this respect being the TRY and the ZAR.

Year-to-date issuance and 2006 supply outlook

Year-to-date (July 2006) gross bond issuance by supranationals and European agencies has been EUR 133 billion, about 10% down on the corresponding period in 2005, and the indications are that total 2006 issuance will be below the 2005 level. In terms of currency, the largest issuance has been in EUR (42%), although this is down on the year-to-date 2005 figure, followed by USD (30%), GBP (10%), AUD (5%), CAD (3%) and other currencies (10%). In the "other currency" segment, EIB (AAA/Aaa/AAA) has come to the market with issues in the Brazilian real (BRL), sovereign ratings (BB/Ba3/BB), the New Turkish lira (TRY), sovereign ratings (BB-/Ba3/BB) and the South African rand (ZAR), sovereign ratings (BBB+/Baa1/BBB+), and the Norwegian issuer Eksportfinans (AA+/Aaa/AAA) issued an RUB bond in July 2006; the credit rating of Russian sovereign bonds is BBB/Baa2/BBB+.

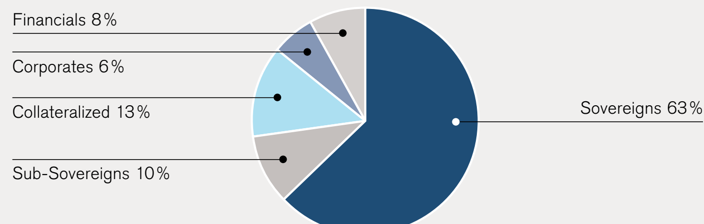
Conclusions

The European public sector offers investors the possibility to invest in bonds with very high credit quality, often with a state guarantee. The bonds are typically very liquid, with some of the major issuers bringing single issues of up to EUR 5 billion to the market. Bonds from public sector issuers have a significant weighting in the widely followed bond indices (see box). Besides the three core currencies, EUR, GBP and USD, the issuers regularly bring bonds to the market in all the currencies of the industrialized countries: JPY, AUD, CAD, CHF, NOK, etc. In the last few years, many of the major issuers have also issued bonds in emerging market currencies. These issues allow investors to play medium-term currency trends without taking credit risk. Although they boast top-quality credit ratings, public sector bonds also offer attractive yield pickups over government bonds in the same currency. For example, the EIB USD 06/11 offers a 32 basis-point pickup over US Treasuries, the EIB GBP 12/11 offers a 25 basis-point pickup over UK Gilts and the KFW EUR 07/11 has a yield pickup of 7 basis-points over the Euro benchmark curve. **Figure 4** shows the additional return in USD of an investment of 1,000 (GBP/USD) in 10-year EIB bonds as opposed to 10-year UK and US government bonds. ■

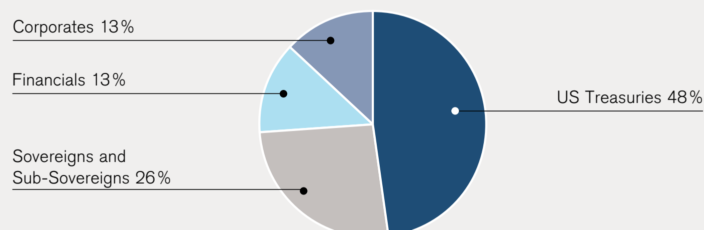
Bond index weightings in EUR and USD

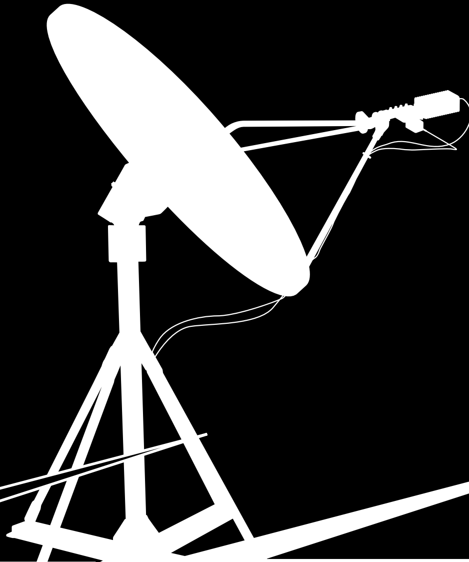
In most general bond indices, government bonds make up the largest single portion of the index, but public sector bonds have a significant weight. We show the segment breakdowns for the widely used iBoxx bond indices in EUR and USD. Source: Credit Suisse, iBoxx

Bond index weightings in EUR



Bond index weightings in USD





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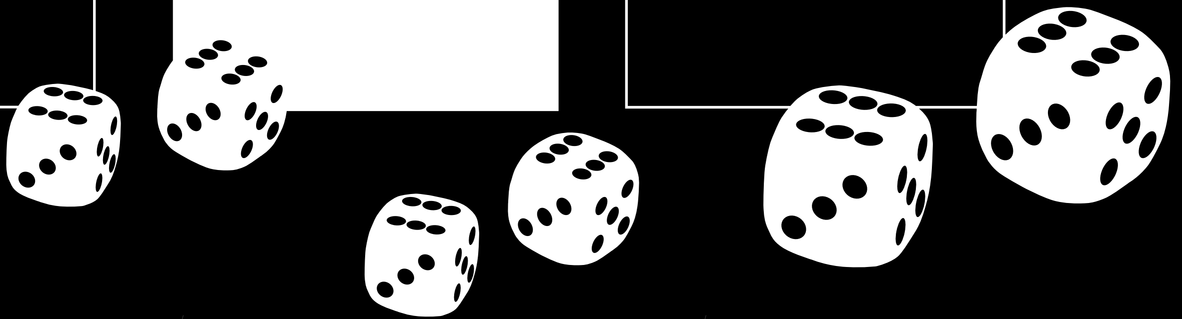
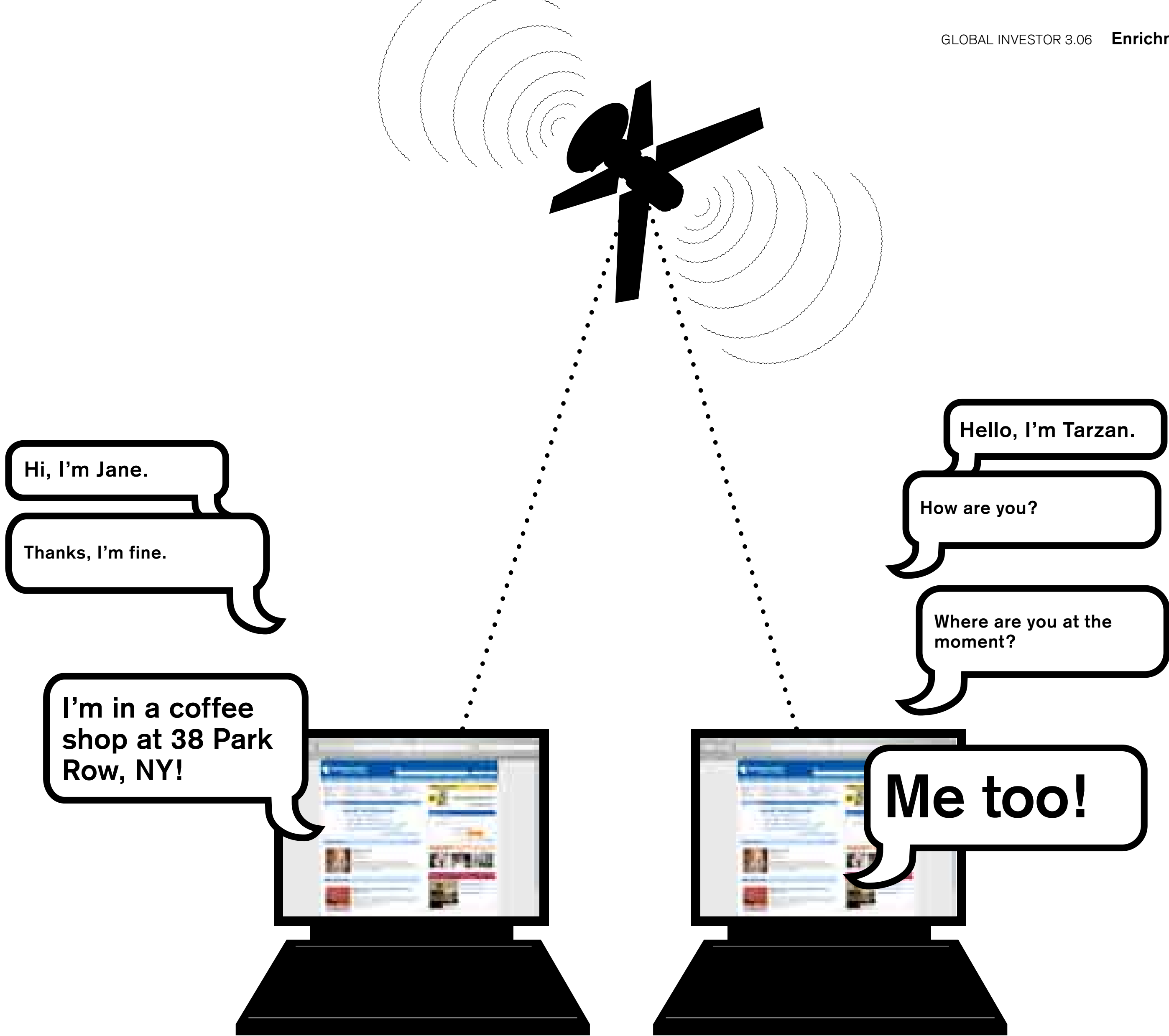
Switching





Digital advertising evolution

The Chinese symbol for crisis has two parts: danger and opportunity. Ten years ago, virtually no one consumed news in digital format – today many people do – "tomorrow" most people will. The same applies to vital information services, retail commerce, and social interaction. This transformation is a crisis for the mass market paradigm upon which many business models are based – a fabulous opportunity for companies that adapt well; a significant danger to those that do not.

Steven Soranno, Equity Sector Analyst

If one asked the average middle-aged adult how corporate marketing shapes consumer preferences, one would very likely hear an answer similar to the following: "Advertisements in major media outlets, such as television or newspapers, are the main way people become aware of new products, and they have a significant impact on how consumers perceive those products before buying them. The process is simplified because large corporations determine which products are carried on the shelves of major local retailers, narrowing the list of items consumers have available to them." In general terms, that description should sound very familiar. It describes a major economic premise in place since the 1950s – the mass market paradigm, based on rules established during the Industrial Revolution.

If one asked the average US teenager the same question, the answer would almost certainly be very different. Teenagers likely consume nearly all their news online. They share opinions about the latest trends on social networking platforms such as MySpace. And they regularly browse the Internet for almost any item they may wish to find, freeing their available product universe from the physical limitations of local retailers' four walls **(see figure 2)**. According to telling statistics, this type of answer is rapidly spreading beyond the younger generation **(see figure 3)**.

Ad spend will always follow eyeballs

Just over a year ago, we formally initiated an investment strategy specifically designed for these trends.[1] During that year, the way the Internet is most commonly used has fundamentally changed, and multibillion-dollar industries have been forced to start changing their business models, truly embodying the term "digital revolution" and generating new global catchphrases such as long-tail economics.

In North America alone, companies spend roughly USD 300 billion on advertising, with many more billions devoted to non-advertising marketing strategies. This figure represents nearly 70% of the world's total (source: Credit Suisse), but secular forces are combining to make the investment opportunity a truly global one.

At the heart of the digital advertising investment opportunity is a simple relationship: advertising money is best spent where consumers' attention is concentrated, particularly when return on investment is measurable and high. Even if one excludes social networking and e-mail, arguably the Internet's two most time-consuming activities, we estimate one fifth of the average person's media-con-

Table 2 Source: Credit Suisse

Representative digital advertising portfolio
Several companies have unique and valuable assets that give them an ability to help shape the development of emerging digital advertising trends.

Company	Investment theme	New paradigm role	Ticker	Rating
Google	Follow the Money	Digital enabler	GOOG	BUY
Akamai Technologies	Internet Data Center	Infrastructure provider	AKAM	BUY
News Corp.	Darwinian Media	Content supplier	NWS	BUY

Table 1 Source: Credit Suisse

Advertising's changing flow
Secular forces are combining to create a uniquely 21st century consumer who has a wealth of new digital platforms through which to disrupt multibillion-dollar traditional advertising segments.

Traditional platform	→	"Game changing" technologies	→	2005 ad spend
Radio	→	Satellite/MP3/Internet	→	USD 20 billion
Television	→	DVR/on-demand TV/video games/social networking and viral video	→	USD 45 billion
Direct mail	→	Internet/on-demand video	→	USD 57 billion
Newspapers/magazines	→	Digital news/social networking	→	USD 60 billion

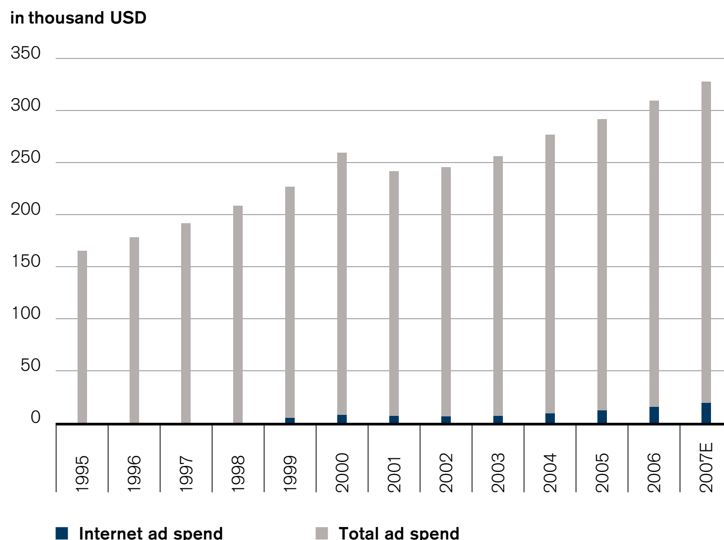
suming time is spent online (including Web-based video games). Yet despite the Internet's superior consumer targeting features, Internet advertising still accounts for only 5% of total advertising monies spent **(Credit Suisse estimate – see table 1 and figure 2)**.

We believe this inequity will continue to rapidly equilibrate, particularly as long-accumulated inertia within the US advertising industry breaks. For instance, over the past year, every major advertising agency has woven their previously separate "new media" departments into their broader organizational fabrics. Moreover, in June, the industry's key provider of ad campaign results and accountability data, Nielsen/NetRatings, formally disbanded its core process for collecting media consumption data. Whereas it used to rely on handwritten consumer surveys logging television viewing habits, it is now measuring online streaming video consumption and out-of-home TV viewing, and will migrate to a completely electronic information-gathering format by 2011.

Figure 1 Source: Credit Suisse

Online advertising vs. total spend

Although 21st century consumers are steadily migrating online, digital platforms still account for only a fraction of total spend. The driving forces are secular and the expansion potential is vast.



Digital marketing's next phase

While Internet search remains digital marketing's largest and most developed segment, particularly in terms of ad spend, the industry has evolved enormously over the past year. Social networking and online video have exploded onto the scene to an extent that many Fortune 500 companies are not only re-examining, but also reinventing their marketing strategies. The common denominator between the two is individual expression, which can be a powerful economic force if aggregated and organized effectively, and this is likely to happen as digital technologies evolve. Corporations are losing significant control of the information flow that tells consumers of product availability and, most importantly, shapes opinions.

Early in July, social networking leader MySpace accounted for over 4.5% of all Internet page views, versus merely 0.1% two years before. Over the past year, MySpace moved from near irrelevance to become the Internet's second most-trafficked site, hosting 75% of the traffic of the entire Yahoo network – more than AOL, MSN and Google. As a user-based tool, social networking has expanded at a faster rate than Internet search – and MySpace has expanded faster than Google at equivalent stages. When News Corp acquired MySpace for USD 580 million in 2005, it was widely criticized as having overpaid, but now the deal is regarded by many interested parties as one of the best technology acquisitions in recent history.

- Traditional ad platforms disrupted by social networking: TV, cable, magazines, directory, direct marketing, radio.
- Disrupted-platform 2005 US advertising spend: USD 168 billion.

In February 2005, YouTube was a startup with an office over a pizza restaurant. In June 2006, it was a service from which consumers viewed over 100 million videos per day and that had just signed a contract with General Electric's NBC Universal television network to run specially designed commercial videos for the company's most popular television shows. YouTube's co-founders are former colleagues from the early days of electronic payment leader PayPal. By 2010, nearly half of US households may regularly view video content over the Internet (comScore). According to the Online Publishers Association, news and entertainment videos are the most frequently watched online videos. These also happen to be the television industry's most lucrative advertising segments.

- Traditional ad platforms disrupted: TV, cable.
- Disrupted-platform 2005 US advertising spend: USD 64 billion.

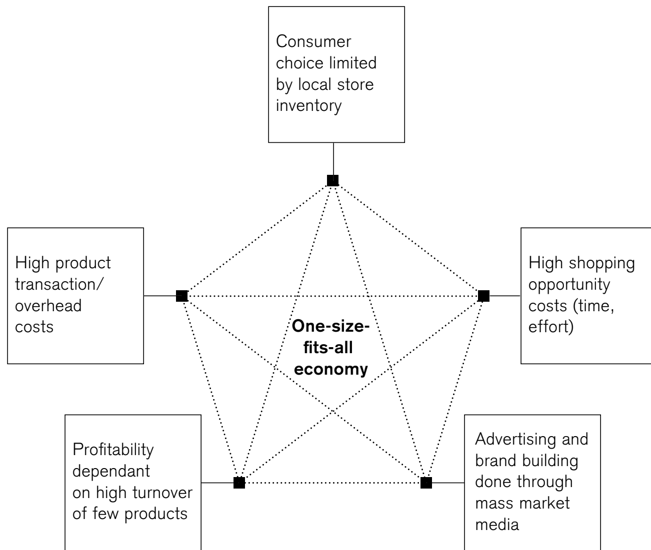
Figure 2

Source: Credit Suisse

The digital economic paradigm

Digitization is combining with powerful secular forces, such as the aging of the PC and Internet generations, to change the basic way companies sell their products and how consumers buy them.

Industrial revolution
Popularity paradigm: Mass-market economics



Digital revolution
Niche paradigm: Economics of abundance

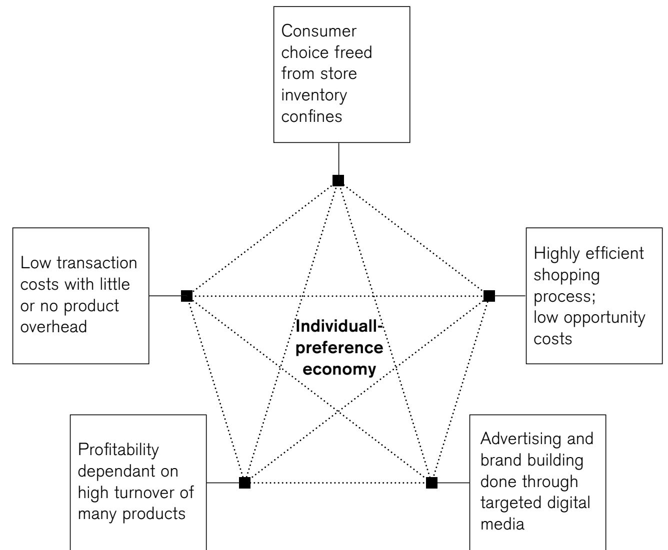


Figure 3

Source: Credit Suisse

The PC generation is maturing

As the PC generation matures, the online population is becoming dominated by consumers with strong purchasing power and technological savvy. This trend will increase as the Internet generation ages.

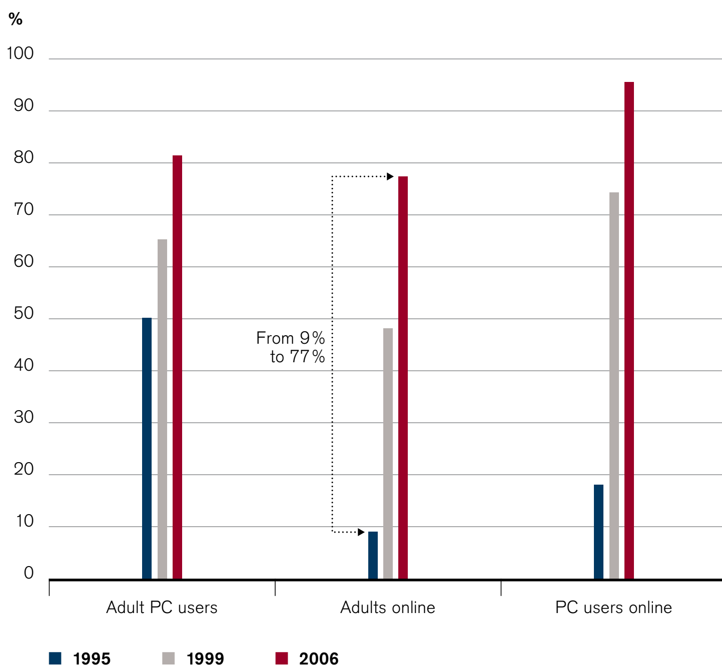
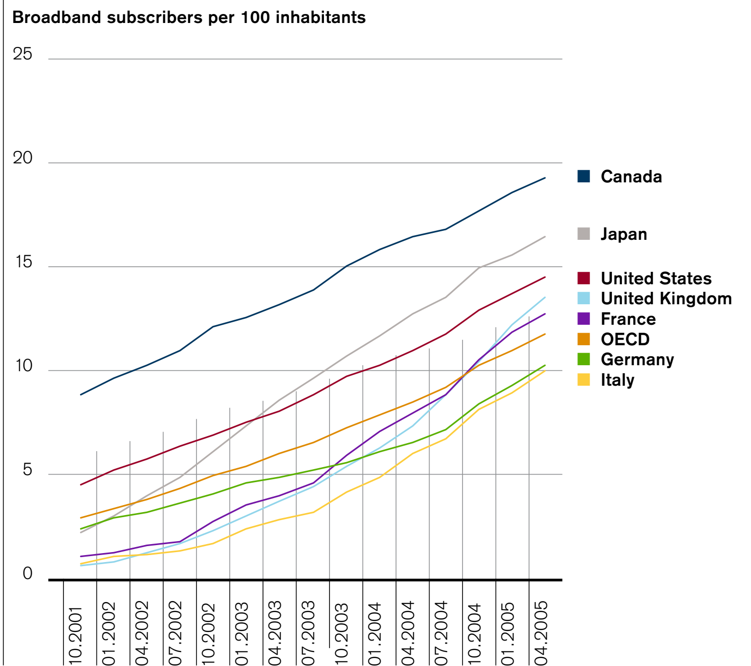


Figure 4

Source: OECD

Global broadband proliferation

As broadband penetration increases, people spend more time and do more things online. This trend changes the way companies communicate with consumers. Advertisers must go where the eyeballs are.



In early 2006, major US television networks began making prime-time television shows and major sporting events freely available on the Internet. In June, Google announced plans to make video commercials available on its advertising partners' Web sites, using the same auction process as for keywords.

- Traditional ad platforms disrupted: TV, cable.
- Representing 2005 ad spend: over USD 64 billion.

The trend is irreversible

Digital technologies can be highly useful tools, but they are really only one cylinder in the engine powering the digital revolution's evolution. MySpace and YouTube would have no gravity if they did not meet growing economic demand. We believe four broad secular forces are combining to fuel the economic transformation:

Aging of the computer and Internet generations: These demographics are comfortable with digital interaction and commerce. Over the next 10 years, they will steadily become the world's wealthiest and most powerful demographic **(see figure 3)**.

Global broadband proliferation: Broadband users "spend more time online… they visit more Web sites, and they buy more products online." – PricewaterhouseCoopers' Global Entertainment and Media Outlook 2006–2010. Free wireless services are rapidly expanding broadband's effective reach. Globally, 9% of adults went online from public locations last year, such as bars, parks, restaurants and airports, up from 5% in 2004. In the USA, the figure was 5%, up from 1% (Ipsos Insight, MediaPost). Roughly 250 US cities have initiated municipal access projects, largely led by the most densely populated ones **(see figure 4)**.

Government regulations: Most developed economies are currently debating how best to adapt their regulatory infrastructures to the digital economic paradigms. Evolving net neutrality legislation in the USA is one example. The need to establish a socio-economic infrastructure that encourages outside investment and domestic economic expansion is forcing nearly every emerging market economy to adopt rules that encourage broadband proliferation, even if at controlled rates.

Emerging market development: Strengthening financial, transportation, and telecommunications infrastructures facilitate digital economics. Global prosperity further supports online usage. Statistically, people spend more time online as they rise up the income scale.

Advertising to the 21st century family

As manual labor shifts overseas, developed economies have tilted towards technology-based service societies, with a focus on education and productivity. Higher-educated couples trend toward two-income households. The proportion of married wage and salaried employees who live in dual-earner couples in the USA has increased from 66% in 1977 to 78% today. The US Department of Labor publishes a detailed study on the nation's socio-economic structure every seven years, with the latest in 2002. We find one segment especially telling in identifying the early stages of a powerful developed-market trend: "Combined work hours for dual-earner couples with children rose 10 hours a week, from 81 hours a week in 1977 to 91 hours a week today (2002). Clearly, today's working couples have less time for their lives off the job… What has been sacrificed? Parents' time for themselves is one factor."

As baby boomers age, elder care becomes an interesting tangential item, given the confluence with dual-income families that already have increasing demands placed upon their time. This trend only increases the likely demand outlook for personal digital devices to better organize, and help maximize the efficiency of, increasingly precious available time. In turn, this trend increases the importance, to marketers, of effectively targeting consumers through platforms that are most likely to gather their attention.

Digital advertising investment themes/recommendations

Rupert Murdoch, News Corp's chairman and CEO, asked himself a rhetorical question in a recent interview: "Can newspapers make money online? Sure. Can they make enough to replace what's going out? At the moment… the answer is no."

Follow the money (long/short): As ad spend shifts to digital platforms, and away from mass-market media platforms, a dichotomy could continue to widen in these companies' valuations. Examples of well-positioned digital advertising leaders with an ability to shape the trend's evolution include Google (BUY), Yahoo (BUY), aQuantive (NR[2]), and ValueClick (NR[2]). Traditional media companies least likely to make an effective transition include Hearst-Argyle (NR[2]), Entercom (NR[2]), Gannett (NR[2]), and Quebecor (NR[2]).

Darwinian media: We believe traditional media companies that have strong digital assets and effective strategies could find the digital revolution to be a significant opportunity, rather than a crisis. In our view, Disney (BUY), News Corp (BUY), and Viacom (HOLD) are best positioned to make the transition to media's new digital paradigm. All three companies have strong bases of valuable programming content, high cash flows and significant international exposure. Each also owns particularly valuable "new paradigm" platforms – News Corp, for instance, owns MySpace. Similarly, as the digital revolution evolves, the variety of potential advertising platforms and the sophistication of marketing campaigns should increase, particularly as companies struggle to adapt to the new environment. This factor should shift power in favor of well-positioned advertising agencies.

Internet data center (long only but diversified): Companies are investing hundreds of billions of dollars in building the infrastructure necessary to chase the evolving online advertising opportunity. Google, for instance, is building roughly 300 data centers, warehouses of computer servers located near key Internet traffic areas, such as major cities. These centers, and others like them, house much of the infrastructure for the developing Internet. Differentiated leaders within this theme include Akamai Technologies (BUY), Equinix (NR[2]), and Digital River (NR[2]).[3] ■

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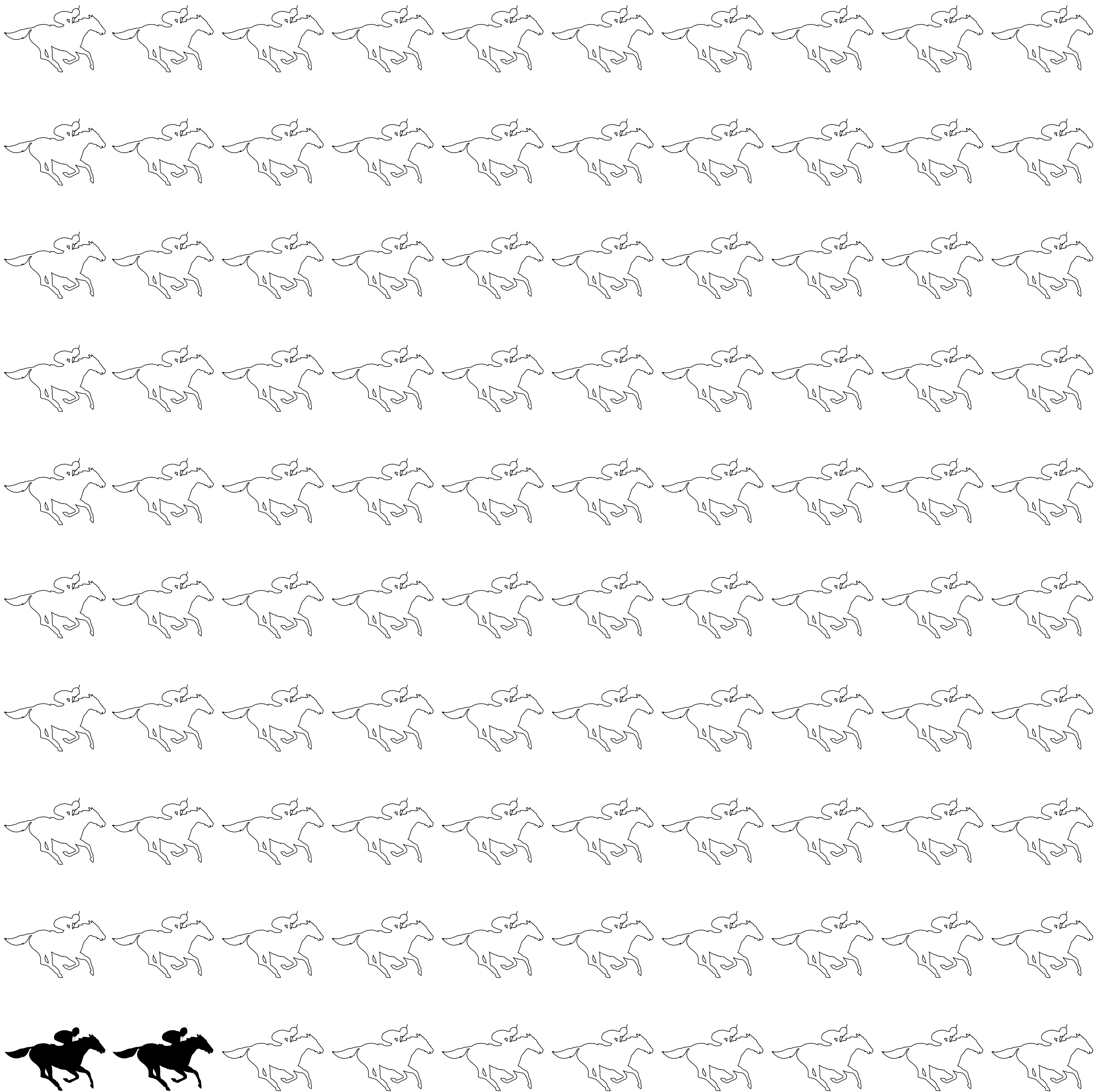
[1] Our 22 June 2005 investment recommendation titled "The Digital Revolution: Advertising Opportunity" was the first in a series of communications designed specifically to explore investment opportunities in different segments of the digital revolution.
The long/short strategy suggested in that note has generated a positive 20% return versus the MSCI World Index… 30% absolute… but is in need of update.

[2] NR: non-rated. Note that we do not rate these stocks and make no recommendations on them as investments.

[3] For investors seeking more diversification and/or wider theme exposure, please refer to our detailed companion piece, "New economy, new rules, new opportunities." For further investment recommendations and insight into the new economic paradigms of the digital revolution, please see our July 2005 IPTV report, August and November 2005 Internet seasonality recommendations, and January investment idea regarding "long tail" investment strategies.



2% of Australia's GDP is spent for betting and gaming

Australia is one of the world's least regulated betting markets. Roughly 2% of GDP is spent on betting and gaming there, compared with 0.5% in Europe and 0.8% in the USA. Current European gaming volumes could quadruple over the next 10 years if the liberalization of gambling makes it as popular in Europe as it is in Australia. The annual market volume for betting and gaming in Europe currently amounts to around EUR 40 billion.

Liberalization of sports betting in Europe

The 2006 FIFA World Cup turned out to be the biggest event in the history of sports betting, at least for the European market. Betting turnover and the number of individual bets placed are continually rising with the proliferation of broadband Internet access. The betting business is still controlled by the state in many EU countries. We expect to see an increasing trend toward liberalization.

Markus Mächler, Equity Sector Analyst

The discussion about liberalizing the betting and gaming market is not new, but it is gaining fresh momentum as the Internet enables easy access across country borders. There are conflicts of interest standing in the way of European market liberalization, since governments control gambling in many countries and also want to prevent problem gambling. We fear the state authorities will lose more control over the gambling and betting market if no action is taken because betting activity will increasingly move towards the gray market and beyond the control of the authorities. A liberalized market would allow technical conditions to be placed on gaming companies that would likely be just as effective at preventing gambling addiction as the current system, if not better. Whatever the near future may bring, it seems that liberalization will be a long-lasting trend, despite limited support from politicians.

The betting and gaming business has traditionally been controlled by the state. Government regulations vary widely from country to country and are even contradictory in some cases. Australia is one of the world's least-regulated betting markets. Roughly 2% of GDP is spent on betting and gaming there, compared with 0.5% in Europe and 0.8% in the USA. Current European gaming volumes could quadruple over the next 10 years if the liberalization of gambling makes it as popular in Europe as in Australia. The annual market volume for betting and gaming in Europe currently amounts to around EUR 40 billion. Within Europe, the UK, Greece, Austria and Gibraltar have the most liberal gambling regimes. Numerous online operators like BetandWin (NR[1]), PartyGaming (NR[1]), 888 (NR[1]) and others have already settled in alongside traditional bookmakers in these countries. The Internet knows no borders, and these online betting operators are attracting customers from less liberalized countries such as Germany, France and Switzerland. The USA is less liberal regarding foreign online betting companies, as seen recently when it arrested BetOnSports CEO Carruthers. BetOnSports is based in Costa Rica and generates over 85% of its turnover from US citizens. Carruthers was arrested on racketeering,

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conspiracy and fraud charges, but there might also be links to the company that he headed, which dismissed him after the charges were announced. In addition, the company had to shut down all its websites following a temporary restraining order.

Gambling addiction prevention or revenue source?

Gambling restrictions in Germany and Switzerland are primarily aimed at preventing addiction, and as a positive side effect they sluice millions worth of additional tax revenue into the respective countries' government coffers. The surplus revenue from their non-profit gambling organizations is used to fund cultural, sporting and charitable institutions and activities. Consequently, liberalization in the various European countries is being pursued only haltingly to keep this key source of revenue from drying up prematurely. Bettors are thus flocking in droves to the gray market in cyberspace. Gambling industry experts estimate that four out of five bets in Germany and a whopping nine out of ten wagers in Switzerland are placed with non-state operators. Hence, a huge proportion of gambling is conducted in the so-called gray zone and thus evades state control. Incidents of match fixing will probably also tend to increase, as evidenced by the recent scandals in Germany and Italy. Early detection of match fixing requires an active exchange of information between gambling control authorities and betting offices. However, since betting operators conduct their business in the gray zone, they do not officially exist and no exchange of information takes place. Active information sharing could facilitate early detection of irregularities such as inordinately large wagers. The recent scandals in Germany (Bundesliga in 2005) and Italy are likely just the tip of the iceberg. It's generally assumed that most of the betting manipulation involves lower-league matches because those largely take place away from the public eye and are thus subject to less scrutiny.

Betting operators have different ways of calculating payout odds. One way is with fixed odds, which barely fluctuate or do not change at all during the betting period, regardless of the size and volume of the wagers involved. To set odds on a match result, the bookmaker relies on statistics based on past performance, player lineups and so forth. The betting window closes before the match starts. The bookmaker bears the financial risk entailed if the odds are set incorrectly.

Another way is with flexible odds, which are determined exclusively by the size and volume of the wagers involved and are not affected by the actual probability of a given outcome. Under the flexible-odds method, bets are also accepted during the match and the betting period ends with the final whistle. The betting operator deducts its commission and then pays out the rest of the wager pool to the winners. It can basically be assumed that information-efficient betting odds accurately reflect the occurrence probability of the possible outcomes. Betting operators most likely use a mixed method to set odds; each operator guards the effective odds-setting method employed as a proprietary business secret.

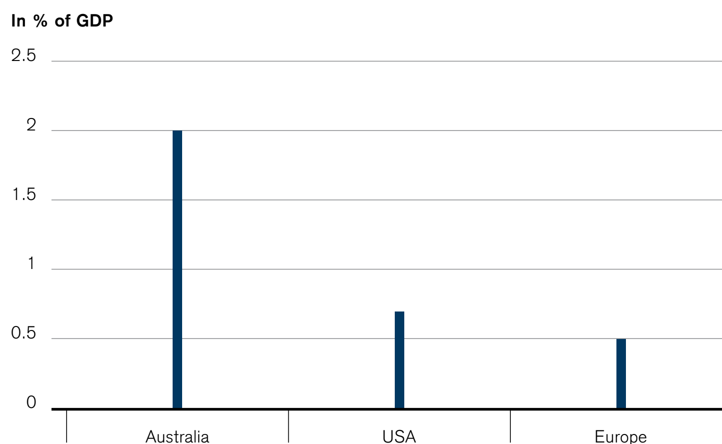
Liberalization is moving along

We believe that a liberalized market will be easier to control than a gray market and therefore anticipate a trend toward further deregulation. Since deregulatory progress is hardly likely to be achieved at the national level, a partial liberalization will probably be strived for and pushed through at the European level. Setbacks like the recent one in Germany, where the Superior Administrative

Figure 1 Source: Global Betting and Gambling Consultants (GBGC)

Spending on gambling

European gaming volumes could quadruple over the next 10 years if gambling becomes as liberal as it is in Australia.



Court of North Rhine-Westphalia issued a ruling banning private sports-betting operators, will merely delay liberalization in our view. The Federal Constitutional Court in Karlsruhe already struck down the state monopoly on sports betting in Germany in March, but it set an indeterminate transition period during which the government can comply with its ruling. Germany is thus moving closer to the European Court of Justice's Gambelli verdict, but in practice it continues to deviate from the court's ruling contrary to market expectations. The present situation in Germany is unlikely to change much for the time being. The Gambelli verdict is based on a 2003 court ruling that upheld the right to freedom of establishment for self-employed service providers and the freedom of said persons to collect sports bets.

Many online betting operators have already established excellent reputations and are taking substantial action to prevent any abuses. Since most Internet-betting firms are very young companies with a very short track record, we consider an investment in this segment to be a very risky gamble. Moreover, local regulatory action against individual operators is unpredictable, as seen in the USA. Aside from the state-run bookmaker Oddset, BetandWin (NR[1]) is the only other "legal" sports betting operator in Germany. However, BetandWin's German license is based on an old German Democratic Republic gaming license, the validity of which is a recurrent subject of legal and political debate – and therefore at risk. A general comparison with the Internet sector is by all means appropriate here. A profusion of new betting portals and operators are sprouting up. After the liberalization of the gambling sector, the industry will undergo a consolidation and not all betting operators will survive. We offer no coverage of pure online broker houses, as the risk involved is still very large and unpredictable in our view.

The betting market is currently expanding at a double-digit growth rate, and the recently concluded Football World Cup gave the sector an enormous boost. An estimated EUR 3.3 billion was spent on Internet gambling in 2005. That figure is likely to double within five years as the online-betting trend advances. Profit margins, however, are plummeting because payout rates have increased from around 91% to 95%, while advertising and administrative costs are on the rise. Growing competition between private betting operators is the culprit behind the margin contraction. State operators mostly offer lower payout rates, which further hurts their attractiveness.

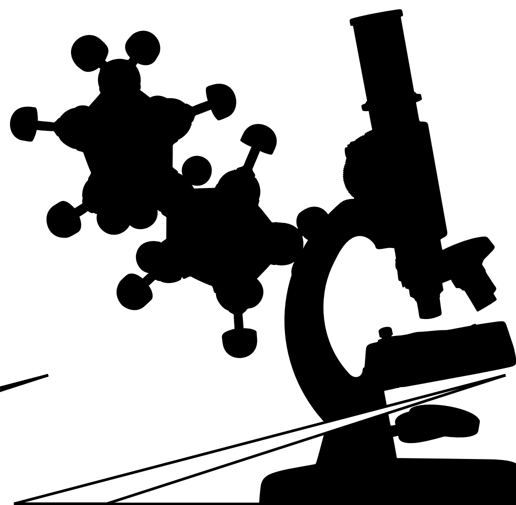
Traditional business model with new drive

Gambling has a long tradition, but online betting is currently experiencing a boom and creating new customer segments. Traditional betting and gaming operators like OPAP and William Hill are also diversifying their business with Internet offerings. But, in contrast to pure-play online bookmakers, the traditional operators have a widely established base business of betting offices that have long generated lucrative cash flows. Last year, online gambling accounted for only 5% of traditional bookmakers' total revenue. That percentage is bound to rise sharply as business increasingly migrates to the Internet. Betting shops and offices, particularly in the UK, will be increasingly converted into sports bars and restaurants equipped with betting windows. We view the gambling business as a defensive industry that has only a slight correlation with the general economic climate. We base this inference on the 1991–1992 recession, which saw gambling revenues slip only 5%, though the inflationary cost base caused profits during that period to fall by around 20% (William Hill and others). We believe that gambling companies are better girded today for such a scenario. The biggest expense item for traditional bookmakers is wages, which for example make up 46% of operating costs for William Hill, followed by building expenses (15%) and then advertising expenditures (6%). At pure online operators, advertising and customer acquisition costs consume nearly 30% of revenues (PartyGaming). Personnel expenses account for 10% of their total operating costs, but IT services (web hosting, etc.) are often outsourced from external providers. More opportunities lie ahead, but investments should currently be limited to traditional companies.

The rapid development of the cell phone industry is destined to give gambling a further boost. Impulse betting by cell phone will likely soon supplant trips to the betting office. The newest technology for transmitting images to wireless handheld devices, via mobile TV for instance, puts a bookie in the bettor's pocket at all times. Although mobile gambling technology is already available, it was mostly disregarded during the 2006 FIFA World Cup because liberalization has not yet sufficiently progressed. It is very difficult to make concrete projections about the future development of the online-betting business because there is not enough historical trend data available and the legal provisions governing the gambling industry have not yet been fully amended. In our view, only pan-European liberalization dictated by Brussels will lead to a satisfactory result. Individual country solutions face too many obstacles due to ingrained political and financial interests. The conflicts of interest are too deeply rooted and politicians seem to be unwilling to resolve them.

We see investment opportunities with traditional providers since they have good cash flows from their existing activities and expansion into online operations poses less of a risk to their bottom line, in our view. We initiated interim coverage on OPAP (BUY) and William Hill (BUY) earlier this year, as we expect them to participate in the growing gaming market while some protection is given due to the traditional shop business the two companies have. ■

[1] NR: non-rated. Note that we do not rate these stocks and make no recommendations on them as investments.



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Enrichment

Switching

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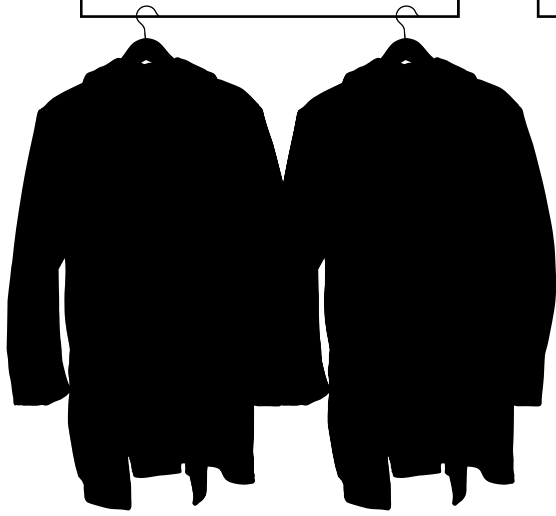

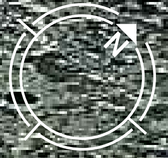

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Spire Corporation (SPIR US)

Angstrom Medica
2
4
Nantero

1
Acusphere (ACUS US)

BOSTON

Understanding nanotechnology

The field of nanotechnology, a science that deals with objects the size of a few nanometers, promises significant advances in a growing number of industries. The reason for nanotechnology's potential is not just the small size of the objects, but the fact that small particles behave differently than objects in our macroscopic world.

Dr. Maria Custer Sigrist, Equity Sector Analyst

Nanotechnology is regarded as one of the key technologies of the 21st century, which will affect not just one industry or market but, as an enabling technology, will create new opportunities in materials, instrumentation, healthcare, electronics, defense, sensors, manufacturing and environment areas. Although the commercialization of nanotechnology is just beginning, nanotechnology was used in approximately USD 30 billion of manufacturing goods in 2005.[1] Market observers forecast that USD 2.6 trillion of global manufactured goods will incorporate nanotechnology by 2014.[2] In order to meet the information needs of our clients, Credit Suisse began following the developments in this area a few years ago. The bank was present at Nanofair 2004 in St. Gallen, Switzerland, and has published several reports, including the "Global Investor Focus: Nanotechnology" in 2005.

Interactive field trip to Boston

So far in 2006, Credit Suisse has organized two interactive field trips for the purpose of meeting with local organizations to exchange know-how and experience. The second interactive field trip was in Boston, and focused on nanotechnology. The main target of the trip to the Boston area, an important nanotechnology cluster (or network of research centers), was to learn about how different industries can benefit from nanoscale developments. We visited the companies described in this report. These firms are not covered by our research and, hence, not recommended. Our intention is to give our clients an overview of companies developing innovative products using nanotechnology with applications in the fields of healthcare, materials and electronics.

Currently, there are more than 600 start-up nanotechnology firms in the USA, with a total of 3,966 US nanotechnology patents having been issued since 1985.[3] This is not surprising considering that the largest source of nanotech funding worldwide is North America (investments in nanotechnology in the USA totaled approximately USD 4 billion in 2005, or 41% of total global investments in this technology last year), followed by Asia (Japan, South Korea and China) and Europe. Besides the amount of funding, the main difference between the USA and other regions is that all three types of nanotech funding are provided: government support, funding by corporations and venture capital (USD 1.7 billion from the US government, USD 1.9 billion from corporations and USD 460 million from venture capital[4]). Asia and Europe invested a total of USD 3.4 billion and USD 2.06 billion, respectively, over the same period of time. While the main sources of funding in Asia were governments and corporations, Europe was mainly dependent on government backing (approximately 60%). Many large corporations with strong research and development departments [e.g. DuPont (HOLD), General Motors (HOLD), BASF (BUY)] have significant expertise in nanotechnology.

Nanotechnology in the Boston area

In the USA, local and regional efforts are already having a significant impact on the development of nanotech companies. Massachusetts, for example, enjoys a leading position in nanotechnology research and development, with three top institutions (MIT, the University of Massachusetts Amherst and Harvard) among the institutions heading global research in this area. The region has an excellent base of scientists and engineers in both academia and industry, and hence a distinct advantage in the interdisciplinary research needed for the most promising work in nanotechnology. In 2004, the Nanoscience and Technology Institute (NSTI) and the Massachusetts Technology Collaborative (MTC) estimated that Massachusetts had over 100 companies focusing on nanoscale products or processes.[5] More than half of these firms were focused in the areas of healthcare (29%) and electronics (22%), most likely due to the state's historic expertise in those areas. Companies developing instrumentation (17%) and materials (13%) are also represented in the region.

Nanotechnology and healthcare

Cellular mechanisms and molecular biology methods are inherently nanoscale processes. The combination of many new technologies, such as the advances made by visualizing techniques (e.g. atomic force microscopy) and the deciphering of human and other genomes, is opening up a new era of understanding biological processes. Advances in nanotechnology providing totally new approaches to manipulate, modify and eventually design and fabricate molecular

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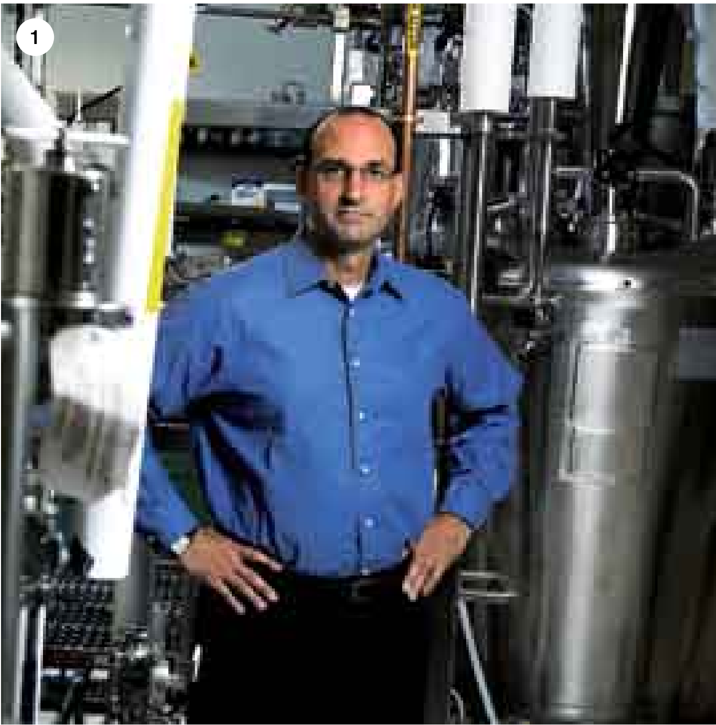


Stephen D. Schultz, Director, Corporate Communications, Acusphere, Inc.: "Acusphere has a unique, patented technology that we have applied to large market opportunities."

Paul J. Mraz, Chairman and CEO, Angstrom Medica: "Nanotechnology is allowing us to develop 'synthetic bone' and create medical devices that mimic the properties of bone in the human body."

Nader M. Kalkhoran, Vice President, R&D, Spire Corporation: "Spire uses a state-of-the-art technology platform to provide its customers with innovative solutions that give them a competitive edge in the energy, health, defense and telecommunication industries."

Greg Schmergel, Co-founder, President and CEO, Nantero: "Nantero specializes in carbon nanotube-based electronics and has become a leader in the quest to make universal memory."

Photos: Johannes Kroemer

	1	2	3	4
	Acusphere (ACUS US)[6]	**Angstrom Medica**[7]	**Spire Corporation (SPIR US)**[8]	**Nantero**[9]
	Employees 110	Employees 10	Employees 118	Employees 35
	Acusphere was founded in 1993 by Sherri Oberg, current President and CEO and Dr. Robert Langer, a prominent professor of chemical and biomedical engineering at the Massachusetts Institute of Technology. This specialty pharmaceutical company develops new drugs and formulations using its microsphere technology.	Angstrom Medica (Woburn, MA) was founded in 2001 as a spin-off from MIT's Nanostructured Materials Research Lab. The privately held company is engaged in the development and commercialization of its patented nanocrystalline calcium phosphate technology NanOss for applications in the medical technology industry.	Spire was founded in 1969 by Roger G. Little, who is currently the Chairman of the Board, President and CEO of Spire. Mr. Little is a graduate of MIT and an avid triathlete. He has been an all-American on Team USA numerous times and has completed the grueling Ironman Triathlon in Hawaii eight times.	Nantero (Woburn, MA) is a nanotechnology company using carbon nanotubes for the development of next-generation semiconductor devices. These devices include memory, logic and other semiconductor products. In the field of memory, Nantero is developing NRAM, a high-density nonvolatile random access memory. Nantero is the first company to actively develop semiconductor products using carbon nanotubes.
Technology	Acusphere develops new drugs and improved formulations of existing drugs using its proprietary porous microsphere technology. The company focuses on developing proprietary drugs that can offer significant benefits such as improved safety and efficacy, increased compliance, greater ease of use, expanded indications or reduced costs. Acusphere's HDDS technology converts hydrophobic drugs into microparticles or nanoparticles of the drugs embedded in small microparticles, such that the drugs can rapidly dissolve in water.	NanOss is engineered synthetic bone and is the first material that duplicates the microstructure, composition and performance of human bone. Utilizing nanotechnology, calcium and phosphate are manipulated at the molecular level and assembled to produce materials with unique structural and functional properties not seen before in other calcium phosphate-based materials. NanOss implants will provide the gold-standard benefits of autograft with the strength found in metal or composite devices and obviate the need for structural allograft.	Spire offers products and services for energy manufacturing equipment, biomaterials and biomedical devices, as well as optoelectronic components. In addition to highly engineered equipment manufacturing, Spire conducts cutting-edge surface modification of metallic, ceramic, semiconductor, and polymeric materials and devices on the micro- and nanoscale using core technologies such as ion implantation, ion beam-assisted deposition (IBAD), ion plasma treatment and metalorganic chemical vapor deposition (MOCVD).	Nantero is developing a high-density nonvolatile random access memory chip that can replace DRAM (dynamic RAM), SRAM (static RAM), flash memory and ultimately hard disk storage – in other words, a universal memory chip suitable for countless existing and new applications in the field of electronics. NRAM will be considerably faster and denser than DRAM, have substantially lower power consumption than DRAM or flash, be as portable as flash memory and be highly resistant to environmental forces (heat, cold, magnetism).
Intellectual property	Acusphere holds over 20 US patents on its core technologies: small, porous microspheres that may be customized to address the delivery needs of a variety of drugs.	Angstrom Medica has one approved patent for its core technology and four patents pending.	Spire holds over 60 US patents relating to its core technologies and products.	Nantero's extensive intellectual property portfolio currently includes over 80 patent applications, of which over 10 have already been granted.
Products/Applications	Acusphere's three initial product candidates are designed to address large, unmet clinical needs within cardiology, oncology and asthma. ■ AI-700, currently in Phase 3: An ultrasound contrast agent for the detection of coronary artery disease. It comprises porous microspheres containing gas, an effective reflector of ultrasound and designed to assess myocardial perfusion, a sensitive marker for coronary heart disease. ■ AI-850, completed US Phase 1: A readily dissolving formulation of the cancer drug paclitaxel. ■ AI-128, completed European Phase 1: An inhaled sustained-release asthma formulation.	NanOss chemistries have been developed in both hydroxyapatite (HA) and tri-calcium phosphate (TCP) formulations. Angstrom Medica is currently focused on developing: ■ Structural NanOss – weight-bearing medical devices that remodel into bone ■ Injectable NanOss – injectable, endothermic, weight-bearing bone cements ■ Bioactive coatings – programmable bioactive coatings with nanosurfaces; initial development efforts focus on applications in the sports medicine, trauma, spine and general orthopedics markets.	■ Spire Solar supplies specialized equipment for producing photovoltaic solar modules, and installs high-quality photovoltaic systems. ■ Spire Biomedical offers surface treatments to enhance the durability and biocompatibility of medical devices, and markets premium hemodialysis catheter devices. ■ Spire R&D develops innovative products in various fields, such as biomaterials, medical implants, biophotonics instrumentation and life sciences, and defense electronics and homeland security.	
Partnerships	Currently, Acusphere is partnered with Nycomed for European marketing rights for AI-700.	Angstrom Medica is currently in active discussions with potential partners for co-development and distribution.	Spire provides services and products for over 300 customers worldwide, in the fields of alternative energy, biomedical devices and optoelectronics.	ON Semiconductor, BAE Systems, Brewer Science, Inc., ASML.
Funding	Acusphere became a publicly traded company in October 2003 and is listed on the NASDAQ, ticker ACUS, market cap USD 100 million. Acusphere has raised over USD 175 million in the public markets since its IPO. The company is in development stage, and revenues to date have come from the AI-700 European marketing partnership with Nycomed.	Angstrom Medica has raised USD 4.5 million in private equity financing, most recently completing a USD 3.7 million Series B Round in August 2004. Additionally, the company is the recipient of nearly USD 1.25 million in NIH and NSF/SBIR grant awards. Angstrom Medica is currently soliciting a USD 7 million Series C Round of private equity financing.	Spire Corporation became a publicly traded company in 1983 and is listed on the NASDAQ, ticker SPIR, with a market cap of over USD 60 million.	USD 31.5 million in venture funding to date, and revenue being generated already in the millions.

structures may ultimately change the whole discipline in the long term. Many applications from drug delivery to advanced diagnostics are currently being researched. Nanotechnology will mainly affect the medical industry in areas such as drug delivery, tissue engineering, diagnostics and drug discovery. Massachusetts is a leading center of medicine and medical technology, providing a good environment for applying nanotechnology to new drugs, medical devices and other products manufactured by the state's life science companies. We visited two companies developing products for the healthcare industry, Acusphere and Angstrom Medica.

Acusphere (Watertown, MA) was founded by Sherri Oberg, current president and CEO, and Dr. Robert Langer, a prominent professor of chemical and biomedical engineering at the Massachusetts Institute of Technology and member of all three US National Academies. Dr. Langer developed the concept that synthetic materials could be more effective than the existing technology using natural materials to house gas that could function as a contrast agent for ultrasound as it traveled through the bloodstream. Acusphere develops new drugs and improved formulations of existing drugs using its proprietary porous microsphere technology. The company focuses on developing proprietary drugs that can offer significant benefits, such as improved safety and efficacy, increased patient compliance, greater ease of use, expanded indications or reduced cost. Its three initial product candidates are designed to address significant unmet clinical needs in cardiology, oncology and asthma. The prime product candidate is a cardiovascular drug in Phase 3 clinical development for the detection of coronary heart disease, which is the leading cause of death in the USA.

Angstrom Medica (Woburn, MA) was founded in 2001 as a spin-off from MIT's Nanostructured Materials Research Lab. The privately held company is engaged in the development and commercialization of its patented nanocrystalline calcium phosphate technology NanOss™ for applications in the medical technology industry. Using nanotechnology, calcium and phosphate are manipulated to produce materials with specific structural and functional characteristics, similar to those of human bone tissue.

Nanotechnology and materials

The generation of mechanical energy greatly depends on the availability of suitable materials. Steel was virtually the only choice in the 19th century. Since then, much stronger and lighter materials have been developed and used to increase efficiency. Many of these new materials owe their outstanding properties to their nanoscale crystalline structure. While materials processing was based on trial and error in the past, nanotechnology now offers a well-controlled approach. More recently, fundamentally new materials have been discovered, such as so-called carbon nanotubes, which exhibit a mechanical strength 20 times that of steel, but with just one-sixth of the weight. Such discoveries will undoubtedly lead to cost savings, improved efficiency and completely new solutions and devices. Materials for surface coating play a particularly important role. Through nanotechnology, surfaces can be developed with new functionalities, such as resistance to wear or dust. Despite the relatively small size of materials-related industries in Massachusetts, the state is home to several companies that are leaders in specific materials markets, as well as many smaller companies that have established a presence in carbon-based nanomaterials.

Spire Corporation (Bedford, MA) provides nanotechnology-based products and services to customers in medicine, telecommunication and alternative energy. Their nano-structured coatings and nano-engineered surface treatments improve the performance of medical implants (orthopedic prosthetics, medical catheters etc.) The company is a pioneer in using nanoscaled materials for the fabrication of optoelectronic devices and materials for the fabrication of solar cells.

Nanotechnolgy and electronics

Electronics and information processing, which shaped the evolution of industry in the past century, have reached a critical point. The extreme complexity of present systems – combining hundreds of millions of highly interlinked basic switching elements on one chip – call for completely new approaches and solutions. Nanotechnology should provide the next stepping-stone to make further miniaturization possible. Scientists have demonstrated that new significant advancements can be made using nanotechnology, including totally new concepts for computing based on quantum devices. Electronics industries are an important part of Massachusetts' technology, and the state is one of the leading regions in many industry categories. We visited Nantero during our interactive field trip.

Nantero (Woburn, MA) is a nanotechnology company using carbon nanotubes for the development of next-generation semiconductor devices. These devices include memory, logic and other semiconductor products. In the field of memory, Nantero is developing NRAM, a high-density nonvolatile random access memory. The company's objective is to deliver a product that will replace all existing forms of memory, such as DRAM, SRAM and flash memory, with NRAM serving as a universal memory. The potential applications for the nonvolatile memory that Nantero is developing are extensive and include the ability to enable instant-on computers and to replace the memory in devices such as cell phones, MP3 players, digital cameras and PDAs, as well as applications in the networking arena. NRAM can be manufactured for both standalone and embedded memory applications. Nantero will license complete packages to enable manufacturers to produce, market, and sell nanotube-based semiconductor products, such as NRAM, which can be used in both stand-alone and embedded memory applications. These technology transfer packages will include a process module and the associated process knowledge, intellectual property rights and the necessary nanotube materials. Nantero is the first company to actively develop semiconductor products using carbon nanotubes. Nantero's extensive intellectual property portfolio currently includes over 80 patent applications, of which over 10 have already been granted. ■

[1] The Nanotech Report 4 Lux Research 2006.
[2] The Nanotech Report 4 Lux Research 2006.
[3] VDI Technologiezentrum Kommerzialisierung der Nanotechnologie, 2006.
[4] The Nanotech Report 4 Lux Research 2006.
[5] MTC and NSTI "Nanotechnology in Massachusetts."
[6] Information provided by Acusphere. Credit Suisse Private Banking research does not provide research coverage or an investment recommendation for this company.
[7] Information provided by Angstrom Medica. Credit Suisse Private Banking research does not provide research coverage or an investment recommendation for this company.
[8] Information provided by Spire Corporation. Credit Suisse Private Banking research does not provide research coverage or an investment recommendation for this company.
[9] Information provided by Nantero. Credit Suisse Private Banking research does not provide research coverage or an investment recommendation for this company.

Discovering alternative assets

Alternative investments can considerably enhance the combination of risk and return available to modern investors and help to improve diversification. Every serious investor should consider investments in hedge funds, private equity, commodities, real estate and other alternative assets.

Cédric Spahr, Head of Alternative Investment Research

As modern finance theory has blossomed in recent decades, building on early roots such as Harry Markowitz's seminal 1950s paper on portfolio diversification, both institutional and private investors have increasingly sought to implement the new academic ideas. The aim has been to achieve a better risk-reward balance, either at the level of individual assets, or at the portfolio level by adding new assets that have a low correlation with traditional financial investments such as equities and bonds. This has given an increasingly prominent role to so-called alternative investments, which are usually taken to include hedge funds, private equity, foreign exchange overlays, managed commodity funds, real estate, forestry and sometimes, assets such as art or fine wines.

Alternative assets differ from traditional investments in ways that can bring both advantages and disadvantages. For example, private equity funds typically become directly involved with the management of the companies they own through board representation or by making experts available. This injection of expertise can help boost returns by improving efficiency or expanding market opportunities. However, since most of the investments made by private equity managers are in companies that are not exchange-listed, the level of transparency with regard to activities and valuations is substantially less than in the public markets. Hedge funds frequently invest in a much wider range of instruments than conventional managers, which again should imply a better risk-return profile. On the other hand, they may take more concentrated positions, and they are often less liquid. Alternative assets can thus be an attractive complement to traditional asset classes, provided their strengths and weaknesses are properly exploited. Alternative investments do not constitute a panacea against adverse market movements, but they can considerably help soften the swing in values that portfolios can experience in periods of financial market distress.

Figure 1 depicts the different sets of efficient portfolios that were available to investors between 1994 and 2006, based on a portfolio optimization performed with historical figures. While the results are specific to the rather short time period for which data were available, and must therefore be treated with some caution, the broad picture is in line with financial theory, and we believe it is helpful in understanding the potential benefits of alternative investments. Investors allocating funds only to bonds and equities achieved decent returns, but those who considered alternative investments such as real estate, private equity, commodities and hedge funds clearly realized a much more attractive combination of risk and return.

Alternative investments cover a very broad area, and here we can only provide a brief sketch of some of the key aspects of the different types, focusing on hedge funds and private equity, with some brief notes on other alternative asset classes. In future, we will provide more information in our new regular publication, "Research Monthly: Alternative Investments."

Hedge funds: A wide range of opportunities

Hedge funds are usually structured as limited partnerships, and there are now between 6,000 and 8,000 of them, varying in size from a tiny USD 10–20 million up to mega funds with USD 5–10 billion of assets. Together, they manage between USD 1.2 trillion and USD 1.5 trillion according to varying estimates, with a relatively large part of this concentrated in the top 20% of funds. By way of comparison, global bond markets are worth roughly USD 35 trillion, while global stock markets make up close to USD 43 trillion in market capitalization. Hedge funds can resort to a broad range of financial instruments and investment techniques, such as short selling, the use of options, credit default swaps and other derivatives, as well as sometimes substantial leverage. These complex strategies can lead to high returns and often, though not always, lower volatility than would be obtained from conventional investments that offered similar potential returns. The hedge fund industry is generally subject to limited regulatory supervision compared with many more traditional investment sectors, and is also changing very frequently as it continues to expand rapidly. Both these factors

imply a need for careful selection and advice when investing in hedge funds, as does the very wide choice of types available.

Among the very broad spectrum of investment styles followed by different hedge funds, some focus on holding long positions in certain favored equities against short positions in others that are expected to fall in price. Others try to identify and exploit price anomalies between one class of asset, such as convertible bonds, and other related assets, such as the stocks and bonds issued by the same company. And others are more macro-oriented, taking positions in currencies, commodities, bond or stock market futures, and other instruments that relate to the broad markets or economy rather than individual companies. The adroit use of this greater flexibility helps many hedge funds to generate returns that truly have low correlation with normal stock and bond markets, while others are not so low. We illustrate this in **figure 2** for the (relatively short) 2000–2006 period, showing that the returns of some hedge fund styles have a significant correlation with the movements of traditional asset markets, while others are more independent. The latter type may be particularly interesting for those investors who are most focused on diversification, although hedge funds from across the style spectrum can potentially play a role in improving portfolio performance. Again, specialist advice is important in selecting hedge fund styles as well as individual managers.

The investment style adopted by a hedge fund has a large influence on the returns and risk profile it can offer. Hedge fund strategies with a large directional bias, such as emerging markets, global macro or long-short equity, tend to exhibit greater sensitivity to the movements of traditional asset classes, while relative value strategies such as equity market neutral or fixed income arbitrage, which play on the relative performance of securities within the same asset class, react less to market movements.

Private equity investments

Private equity generally constitutes an investment in equity securities of unlisted companies, giving them substantial or total management control. Historically, such investment vehicles have been mainly accessible only to large institutional investors or qualified private investors. Recently, a new trend has been set with the successful listing of KKR Private Equity Investors (NR[1]), a vehicle that invests in KKR's private equity funds, and stands alongside the few traded private equity funds (such as 3i (NR[1]), listed on the London Stock Exchange) already available on the market.

Investments in private equity tend to generate returns that exceed those of traditional equity markets, but the correlations of returns have tended to be medium rather than low. The source of excess returns is a blend of active management and superior growth potential. Private equity investors exercise closer control over the management decisions of privately held companies and usually provide industry know-how. In addition, private equity investments tend to target either medium or even small companies with above-average growth potential, though some much larger firms are also targeted from time to time. The target companies might need to be restructured, broken up into their business units to realize their underlying value (break-ups), merged with other similar companies in order to exploit economies of scale or releveraged to optimize the capital structure. Private equity companies are in practice often the only investors able to unlock growth potential, by using innovative financing methods, applying superior management, making tough decisions that former management was not prepared to take, or

Figure 1 Source: Credit Suisse

Portfolio's efficient frontiers

Adding alternative assets to the investable universe vastly improved the available set of efficient portfolios. Hedge funds and real estate offered the best efficiency gains in the alternative asset universe.

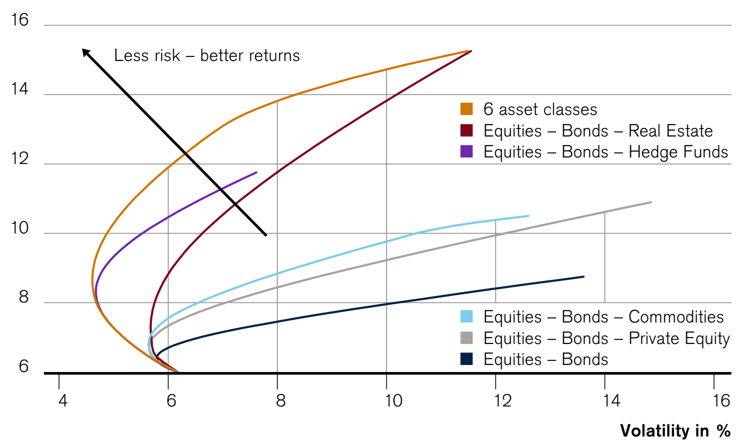


Figure 2 Source: Credit Suisse

Risk attribution and correlation

Many hedge fund strategies are strongly correlated with traditional asset classes (risk attribution model, 2000–2006).

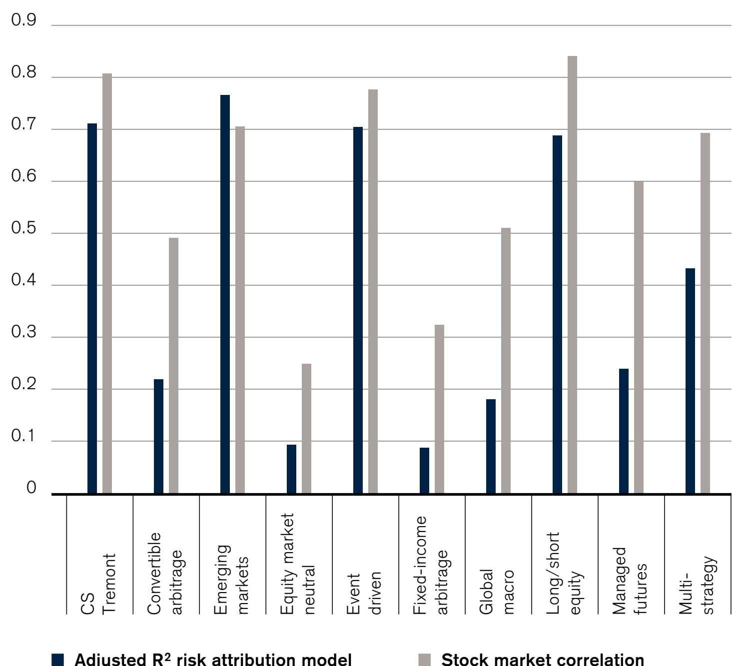


Figure 3 Source: Datastream, Cambridge Associates

US GDP growth and private equity returns

US GDP growth and private equity returns tend to be correlated over the medium-term time horizon.

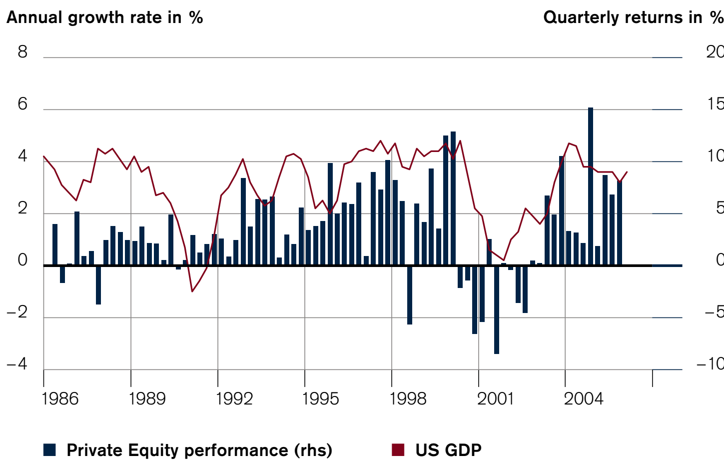


Figure 4 Source: Credit Suisse

Correlation patterns

The power of diversification is made visible by illustrating various correlation patterns of selected asset class returns (1994–2005).

	Equities	Bonds	Real estate	Hedge funds	Private equity	Commodities	FX overlays	Art
Equities	1.00	0.08	0.36	0.48	0.40	0.05	0.06	−0.02
Bonds	0.08	1.00	0.22	−0.08	−0.12	0.11	0.16	−0.02
Real estate	0.36	0.22	1.00	0.23	0.19	0.02	0.15	−0.02
Hedge funds	0.48	−0.08	0.23	1.00	0.36	0.15	0.26	−0.12
Private equity	0.40	−0.12	0.19	0.36	1.00	−0.10	0.13	−0.06
Commodities	0.05	−0.11	0.02	0.15	−0.10	1.00	−0.04	0.00
Foreign exchange	0.06	0.16	0.15	0.26	0.13	−0.04	1.00	−0.15
Art	−0.02	−0.02	0.02	−0.12	−0.06	0.00	−0.15	1.00

< 0   0–0.2   0.21–0.4   0.41–0.99

Figure 5 Source: Credit Suisse, CS Tremont Index

Hedge funds

In a market marked by rising volatility, hedge funds can offer capital preservation and steady returns. However, the selection of appropriate hedge fund styles and managers remains a key success factor.

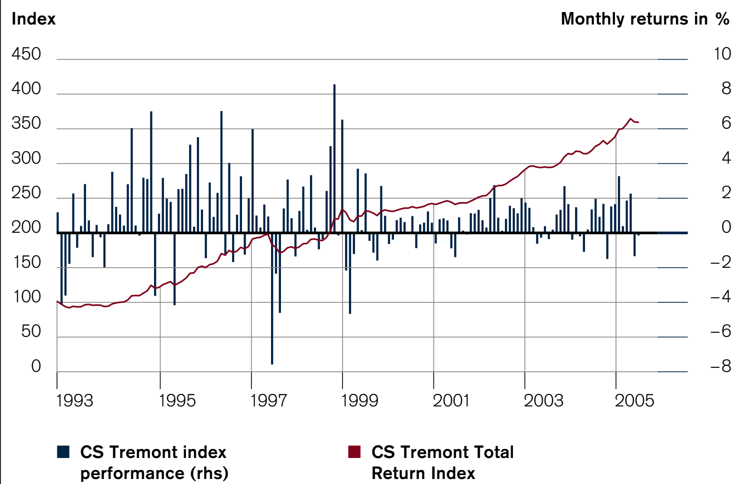


Figure 6 Source: Cambridge Associates

US Private Equity Index

Investments in unlisted companies are illiquid but tend to deliver returns superior to those of listed equities. The correlation to equities of well below 1 helps to improve the risk-return profile of a portfolio.

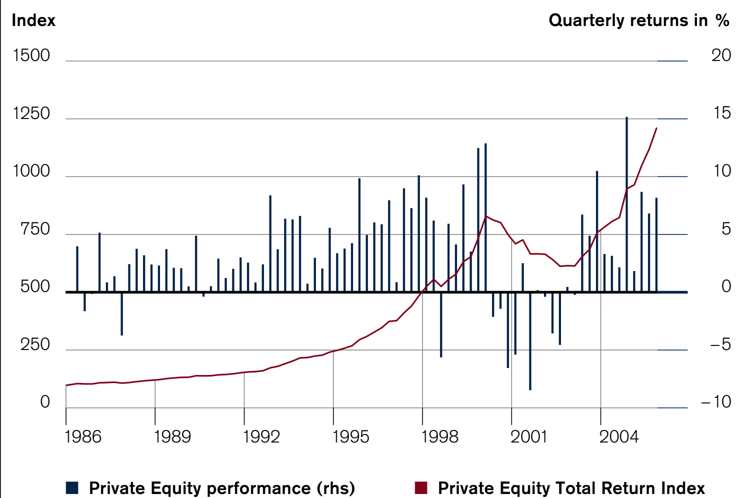


Figure 7 Source: Bloomberg, DJ AIG Total Return Index

Commodities

Commodity futures have generated equity-like returns over the long term and have a relatively high volatility and low correlation with equities. This trend in commodity prices is expected to continue.

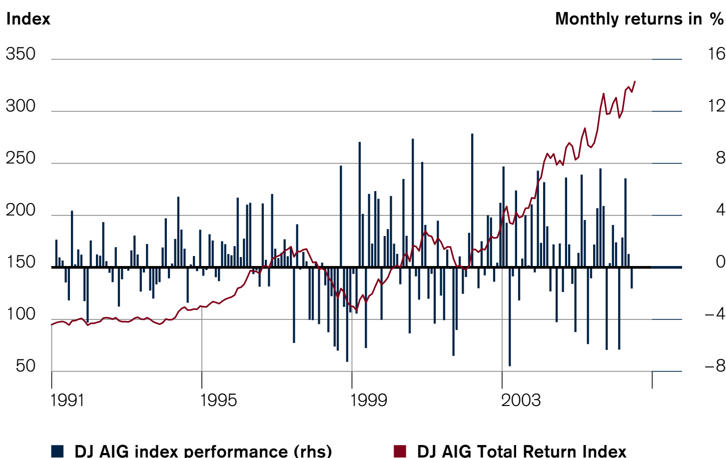


Figure 9 Source: Bloomberg, Barclays Currency Trader Index

FX overlays

Diversification benefits of FX overlays stem from the large spectrum of strategies. Since 2004, the returns of FX overlays suffered from adverse market conditions, emphasizing the need for good manager selection.

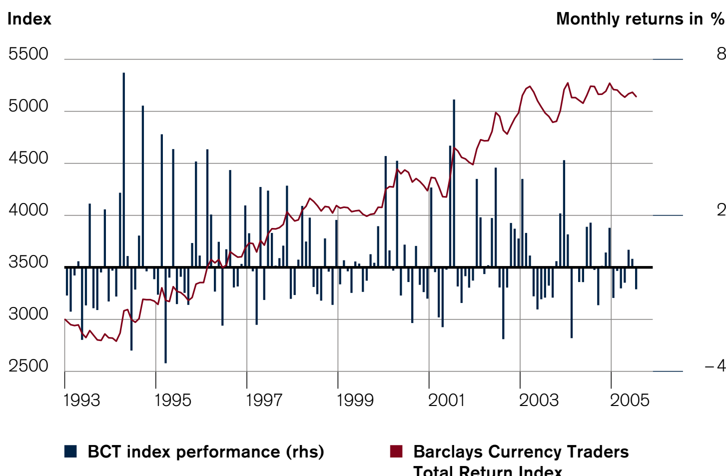


Figure 8 Source: Bloomberg, GPR REIT World index

Listed real estate

Historically, real estate assets revealed an equity-like risk-return profile, but with useful diversification potential. Presently, we prefer investments in Asia (excluding Hong Kong) and Europe.

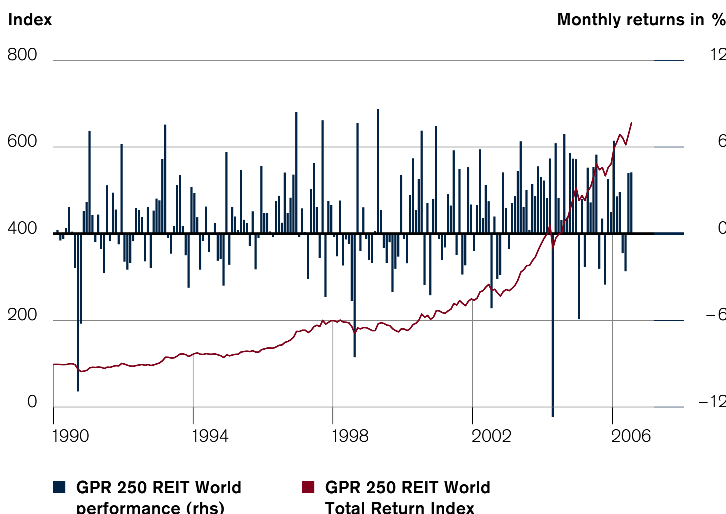
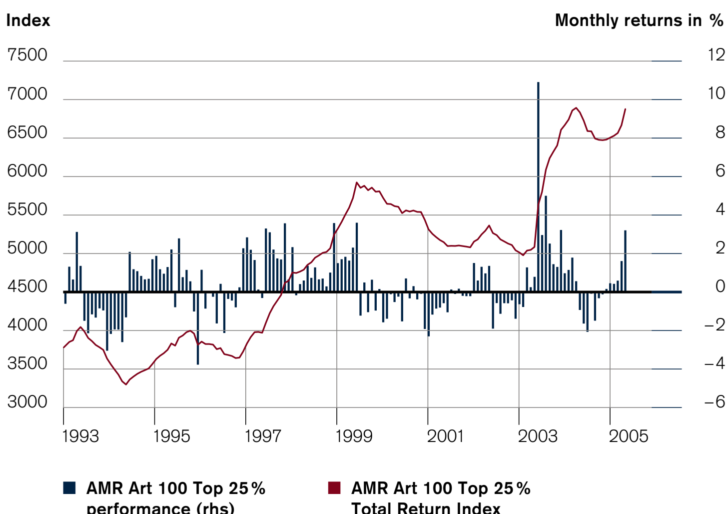


Figure 10 Source: Art Market Research, Art 100 Top 25%

Art market

The art market remains buoyed by a strong economy and the windfall profits generated by commodity prices in major emerging regions.



seeking merger partners or buyers for partial spin-outs. Investments in private equity are normally very illiquid, with capital being committed for an uncertain period and often being paid back in tranches as the underlying assets are realized over a period of perhaps about 3–6 or more years. Moreover, both the return **(see figure 3)** and the holding period of private equity investments tend to depend on the underlying economic cycle. Private equity funds must wait for appropriate capital market conditions to sell their investments, and so if the economy is weak, they may wait perhaps some years longer to sell than they would in a stronger economy. To compensate for this lack of liquidity, investors should expect to earn higher returns on private equity investments than on equities, reaping a so-called illiquidity premium. For investors who find this illiquidity unappealing, the growing number of listed private equity vehicles offers a way to gain exposure to this asset class, while benefiting from the liquidity of a publicly traded security. Such securities can be bought and sold, but the price will depend on supply and demand. So investors wishing to sell these securities during a down market may find that the price stands at a discount to the underlying asset value. Conversely, during a strong market phase, the price may stand at a premium.

The recorded volatility of private equity returns has been on average lower than in the public equity market. However, considering that a quarterly appraisal of asset value for a private equity fund is unlikely to reflect shifting market conditions fully if at all, private equity will almost by definition show less recorded volatility than traded securities. The US private equity index compiled by Cambridge Associates had an annualized volatility of 8.8% between 1986 and 2005 compared with 16.5% for the S&P 500.

Portfolio power

The benefits of portfolio diversification are illustrated in **figure 4**, which shows correlations among selected broad asset classes in the 1994–2005 period. Within non-traditional asset classes, hedge funds exhibit the highest historical correlation (0.48) with equities, while (other than art) commodities illustrate the lowest (0.05). At the same time, real estate illustrates the highest historical correlation (0.22) with bonds, while private equity exhibits the lowest (–0.12). The monthly returns of selected asset classes with a short descriptive summary of results are shown in **figures 5–10**.

Conclusion

The world of alternative investments is complex in places and has some aspects that are less transparent than traditional investments, and often fees are much higher. However, for some alternative assets, historic returns have often been above those on conventional bonds and equities, reflecting factors such as the premium that the market pays for illiquidity. Moreover, most alternative assets have historically either offered lower volatility than traditional investments that have similar potential return, or a relatively low correlation (which can be used to reduce total portfolio volatility), or both. For these reasons, we believe that many investors should consider holding alternative assets as part of their overall portfolio, to help them move toward an optimum combination of potential risk and return. Investors with long time horizons are well positioned to accept the relative illiquidity of hedge funds and private equity, while reaping the superior risk-adjusted returns these asset classes tend to offer. Other alternative investment categories, such as commodities, real estate, FX overlays or art, also have attractive characteristics when combined within a diversified portfolio. **Table 1** provides an overview of the different advantages and disadvantages of the major alternative asset classes. ■

[1] NR: non-rated. Note that we do not rate these stocks and make no recommendations on them as investments.

Reflecting the importance that we attach to this key investment segment, we have launched a new publication, "Research Monthly: Alternative Investments," to keep investors up to date with developments and key themes in this area.

Table 1 Source: Credit Suisse

Main features of alternative assets

Asset type	Some potential advantages	Some potential disadvantages
Hedge funds	Higher expected return at lower volatility than from traditional bonds and equities. Medium or perhaps low correlation with bonds and equities. Wide range of styles adds to diversification potential.	May be less transparent than conventional bonds and equities, usually less liquid, may be high minimum investment sizes, may not be able to accept new capital, fees may be high. Choice among the wide range of styles implies a need for specialist advice.
Private equity	Can significantly outperform conventional equities due, for example, to active management; ability to identify and possibly consolidate smaller firms.	Long lock-up periods. Part of fund may initially be held in cash or returned non-invested. Less transparent than conventional equities, and fees tend to be higher.
Foreign exchange overlays	Can generate significant returns from relatively low capital commitment. Low correlation to conventional investments.	Returns can depend on the premium from investing in higher-risk currencies. Fund performance can vary greatly, so manager choice is critical.
Commodities	Low correlation to many other investments. Currently seem to be in secular uptrend (though this is not certain and may last years rather than decades).	Can be highly volatile. Careful choice of fund needed, with crude tracking of indices likely to underperform funds that make smarter use of futures contracts.
Real estate	Medium correlation to conventional investments. Can give very high returns over up cycles that last several years; or, decades-long investment should give reasonable returns but with down as well as up phases.	Direct investments fairly illiquid; investment via closed-end funds reasonably liquid but can be more volatile than underlying assets. Diversifying across regions helps consistency of returns but dilutes regional price spurts.

Brands in the emerging markets

Credit Suisse believes that real GDP and income growth in emerging markets, particularly those in Asia and Eastern Europe, will continue to outperform the developed countries. With ongoing strong economic growth and rising GDP per capita, an increasing number of consumers in the emerging markets will become buyers of a wider range of consumer goods, which is likely to boost the business of producers of branded goods.

Olivier P. Müller, Equity Sector Analyst, **Robin Seydoux,** Head of European Equity Sector Research,
Huong C. Belpedio, Equity Sector Analyst, **Maggie Yeo,** Equity Analyst

We are starting to see two different kinds of consumers. On one hand, we have a large and still growing rural population with basic needs, demanding simple, reliable, and affordable products and who are benefiting from gradually improving prosperity. This gives producers of consumer goods a large revenue base for the lower-price segment, such as for basic food or personal-care products. These companies will try to adapt their offer to the cultural, logistical and financial possibilities of the local customers: local products and brands, including the appropriate packaging, size, price, and taste. On the other hand, in booming cities such as Shanghai, the urban population is growing fast and so is its financial muscle, leading to the emergence of both high-net-worth individuals and a middle class. We believe that this market segmentation is now turning out to become more and more important, likely to drive many companies' product offerings in the emerging markets. As GDP **(see figure 1 and table 1)** and GDP per capita increase even more, especially the middle class (affluent) will spend more money as they climb up Maslow's hierarchy[1] and seek to satisfy successively higher needs. Hence, they will move the focus of their spending away from basic products and towards branded, premium and even luxury products: watches, cosmetics, consumer electronics and telecom equipment. Consumers in the Western world may consider most of these items as basic goods, but rising incomes have made some of these products affordable for many people for the first time ever. Furthermore, as the middle class develops, trading up towards more premium products gains importance. Both urbanization and above-average population growth rates in the rural regions are important drivers for continued solid volume growth.

New growth area for luxury goods manufacturers

We expect the number of affluent middle-class persons to grow faster than the rest of the population in emerging markets, particularly in China. Wealth creation supports the view that Chinese consumers, who already represent more than 10% of global luxury goods sales, will continue to generate rapid growth in coming years. Contrary to other branded goods, domestic sales of luxury goods account for only a fraction of total turnover due to higher prices and limited infrastructure. This means that Chinese travelers looking for international brands generate the bulk of turnover. The affluent consumer wants to stand out. Quality and expensive brands help him fulfill this wish. This could explain why watches (Omega, Longines, owned by Swatch Group) and jewelry (Cartier, by Riche-

↗

DRINK
Campa Cola
PURE INDIAN COLA

Economic backdrop in emerging markets to remain favorable

While consumers in the emerging markets are increasingly demanding branded products, affordability pressure, competition from cheap local brands, commodity pressures and reputational risks remain the greatest operating challenges.

mont) are strong product categories as their monetary value is easily identifiable. It is also not surprising that leather goods (Louis Vuitton, by LVMH) and accessories with strong recognizable brands are growing rapidly. Depending on the rate of urbanization and wealth creation, we expect that the mix of emerging market consumers, especially in China, will gradually rebalance in two ways. The importance of male shoppers should diminish in favor of women and younger customers, as economic growth will translate into more social independence and disposable income. The development of local infrastructure (malls, transport) should benefit domestic sales, in particular accessories and ready-to-wear.

Premiumization is paramount to spirits producers

In emerging markets, there is continuing trading up from local beer to international beer and champagne and from local spirits to international branded spirits, especially Scotch Whiskey and Cognac. We expect China and Russia to remain the key growth regions, driven by premiumization and rising per capita spending. SAB Miller, InBev, Diageo and Pernod Ricard all earn a significant part of their sales in emerging markets, ranging from 80% down to 25%, respectively. We believe that this share is likely to further increase, driven by a still high growth differential between emerging markets, particularly Asia (spirits: +3.3% CAGR 2003–2008, Euromonitor), Latin America (beer: +2.7%) and Eastern Europe (beer: 4.8%), and developed countries (e.g. Western Europe, +0.3% for spirits and +0.1% for beer). We note that volatility in sales volumes in the emerging markets is likely to be higher than in the developed countries.

The main growth driver at Coca-Cola and PepsiCo

Emerging markets have been very important for Coca-Cola and PepsiCo over the past five years. We estimate emerging markets have contributed 75% of Coca-Cola's incremental volumes and roughly 60% of PepsiCo's beverage growth since 2000. Emerging markets also drive a large portion of the two companies' long-term profit growth algorithms. We forecast 60% of Coca-Cola's profit growth and 50% of PepsiCo's (including snacks) is targeted to come from those markets between 2005 and 2010. We estimate a 1% change in emerging market GDP causes a 0.9% change in these two companies' emerging markets sales. We believe the economic backdrop in emerging markets remains favorable but business risks linger. The greatest operating challenges include affordability pressures, competition from cheap local brands, commodity cost pressures, and reputational risks.

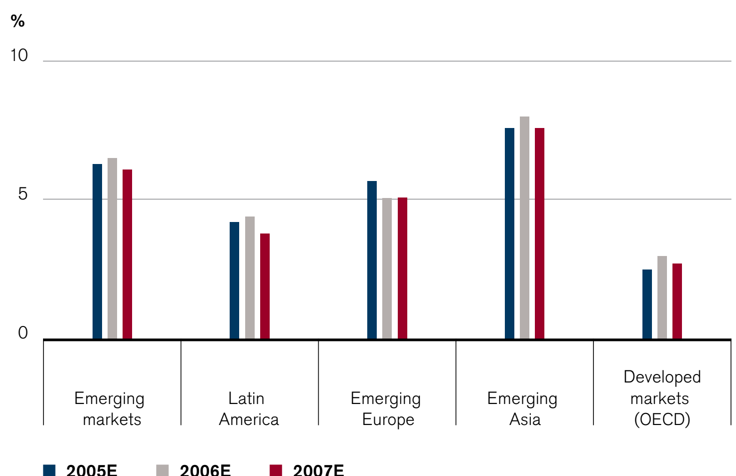
Rising middle class buying more consumer electronics

Another consumption trend in emerging markets in the offing is the migration from cathode ray tube TVs to flat panel TVs, and this is already evident in China. Rising incomes among the middle class in emerging markets, rapidly falling prices and improved functionality are increasing the penetration of consumer electronics in emerging markets. With regards to brand perception, consumers in emerging markets value foreign brands more when buying consumer electronics. Recently, in June 2006, Brazil's government said that it would adopt Japanese technology as the basis for its digital TV standard, which suggests that Japanese consumer electronics would be the major beneficiaries. Sony has established a strong brand name in emerging markets thanks to the success of its legacy businesses of walkmans, videocassette recorders and TVs. Matsu-

Figure 1 Source: Credit Suisse estimates (July 2006)

Real GDP growth by region

According to Credit Suisse forecasts, emerging market regions will continue to outperform the developed countries in terms of GDP growth.



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shita Electric Industrial and Sharp, with their vertically integrated business models and advanced technology, could also benefit from growing demand for consumer electronics products in emerging markets.

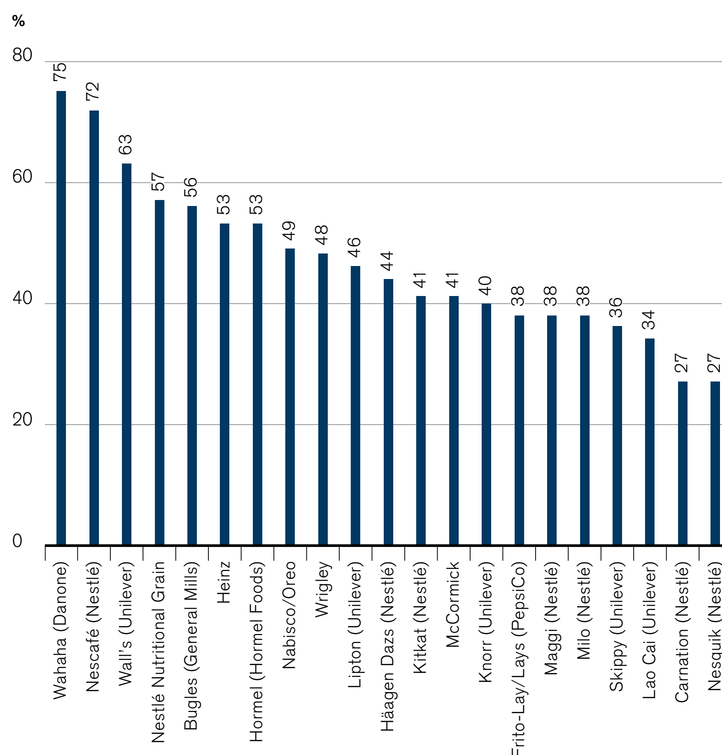
Trading up from basic food needs to branded products

Although there is less of a premiumization or fashion argument for the food-manufacturing sector at the present time, we see two important trends. With rising income, consumers increasingly tend to switch from domestic, non-branded food products to branded products, even at small quantities, as they trust foreign brands more **(see figure 2)**. The second trend, in our view, is water, with emerging consumers moving away from potentially impure tap water to purified water (e.g. Nestlé Pure Life, Danone's Aqua in Indonesia and Wahaha in China) and even branded mineral water in the upper segment, driven by rising per capita consumption from a low base. We believe the water market in emerging markets will continue to grow at solid double-digit rates and expect that more than 60% of sales at Nestlé and Danone's water business will come from emerging markets by 2010. However, we have to remember that sales in emerging markets tend to be highly economically sensitive, since consumers there spend a much larger portion of their income on food products. Also, certain categories, such as fresh dairy, ice cream, chocolate or frozen food may be sometimes difficult to sell. Reasons include the lack of appropriate logistics chains (refrigeration) as well as cultural and climate factors. The four European large-cap food producers Nestlé, Unilever, Danone, and Cadbury Schweppes each generate about a third of their sales in emerging markets. While we expect Nestlé to earn more than that in terms of profit, Cadbury's profitability in the emerging markets is below average. In terms of product portfolio, categories and growth profile, we believe that Danone with its water and functional drinks and Nestlé with its balanced food portfolio are best positioned for the emerging markets, owing to the strength of their brands.

Figure 2 Source: Credit Suisse

China: Awareness of food brands

The brand awareness is based on the Credit Suisse proprietary survey of Chinese consumer lifestyle and spending patterns (December 2005). The question asked to the 2,700 participants was: "Are you aware of the following food brands?"



China and Russia are important markets for tobacco

We recognize that certain investors may have moral issues with investing in tobacco stocks, and although we believe the US tobacco industry provides great returns in terms of significant free cash flows, high dividend yields owing to improved fundamentals and a favorable litigation environment, we would advise those investors to avoid this sector. Despite the increasing concern about rising healthcare costs and greater consumer awareness of the health consequences of smoking, cigarette consumption in emerging markets is rising. We believe China and Russia will provide opportunities for major tobacco companies such as Altria's Philip Morris International and British American Tobacco over the next several years. We estimate that China holds a 31% global volume share and 12% of the profit pool, while Russia has a 6% volume share and 2% of the profit pool. China has about 2 trillion units in volume with 400 million smokers. In 2005, Philip Morris International signed an agreement with China National Tobacco (CNTC) to license the production and selling of Marlboro in China and also established a joint venture to sell CNTC's heritage brands globally. CNTC is a state-run monopoly, controlling around 98% of the tobacco market and generating roughly USD 11 billion in tax revenue. Russia is the fourth-largest cigarette market in the world and one of the fastest-growing markets. We estimate that cigarette demand in 2006 will be

over 300 billion sticks with around 45 million smokers. We estimate the Russian cigarette market to be USD 4 billion. With an improved Russian economy, we are seeing a shift in product preference from discount brands to premium cigarettes. We believe Philip Morris International is better positioned in the emerging markets than British American Tobacco, owing to the strength of its brands. We estimate Philip Morris International generates over 40% of its profits and over 50% of its volumes in the emerging markets. Philip Morris International's brand strength is first-rate, as it owns 7 of the top 20 global cigarette brands, including the number 1 global brand Marlboro. Marlboro appeals to consumers because it is targeted to all adult age groups. We believe it would be difficult for a competitor to allocate the capital and resources required to build a franchise to compete with Marlboro's success on a global basis.

HPC companies benefit from social change

Previously, few women in emerging markets used household and personal care (HPC) products regularly, but this trend is seeing a reversal. Growth in this industry is driven by the increasing sophistication of the female population as their incomes grow. Many women have attained newfound freedom, both at home and in the professional world, and are therefore placing more importance on health and beauty. Growing awareness of personal grooming and heavy advertising have also resulted in the emergence of the men's skin care market, a new business opportunity for HPC makers. The cosmetic companies L'Oreal (2.4% of total sales generated in China in 2005) and Shiseido have launched aggressive offensives in China, the eighth largest global cosmetics and toiletries market with a value of USD 7.9 billion, according to Euromonitor. Unilever has a strong position in personal care in Latin America, while Procter & Gamble has established distribution networks in 2,000 cities and 11,000 towns and villages in China. ■

[1] Maslow's hierarchy of needs refers to Abraham Maslow's theory of human motivation and needs. Maslow suggested five levels of needs, including physiological (health, food, sleep), safety, love/belonging, esteem (e.g. recognition) and self-actualization (e.g. self-fulfillment).

Table 2 Source: Credit Suisse

Recommended branded producers

Companies well-positioned to reap the benefits of rising demand for branded goods, because of their significant exposure to emerging markets.

Subsector	Stocks to focus on
Food manufacturing	**Nestlé, Danone**
Beverages	**PepsiCo, Coca-Cola, Diageo, InBev,** Pernod Ricard, SAB Miller
Luxury goods	**LVMH, Swatch Group**
Automobiles	**BMW**
Cosmetics, HPC	**Colgate-Palmolive,** L'Oréal, Shiseido
Tobacco	**Altria,** British American Tobacco
Consumer electronics	**Nokia, Sony, Matsushita Electric Industrial,** Sharp

Stocks in **bold** are rated BUY, stocks not in **bold** are rated HOLD by Credit Suisse

Table 1 Source: Credit Suisse Demographics Project, UN Population Division

Population growth rates in the emerging markets

Demand for consumer goods in the emerging markets will be well supported by above-average population growth for the next 10–15 years.

Population growth rates (%) in the years	2000–2005	2005–2010	2010–2015	2015–2020
World	1.2%	1.1%	1.1%	1.0%
More developed regions	0.3%	0.2%	0.2%	0.1%
Less developed regions	1.4%	1.3%	1.3%	1.1%
Least developed countries	2.4%	2.3%	2.2%	2.1%
Less developed regions, excluding least developed countries	1.3%	1.2%	1.1%	1.0%
Africa	2.2%	2.1%	2.1%	1.9%
Asia	1.2%	1.1%	1.0%	0.9%
Europe	0.0%	–0.1%	–0.1%	–0.2%
Latin America	1.4%	1.3%	1.2%	1.0%
Northern America	1.0%	0.9%	0.8%	0.8%

Doing business with the best

Paul Calello, Chief Executive Officer Credit Suisse Asia Pacific, on private banking in one of the most diverse regions in the world. **Marcus Balogh,** Bulletin Magazine

Marcus Balogh: Is there anything specific to doing business in Asia that sets the region apart from other places you have worked in?

Paul Calello: Yes, absolutely. To begin with: the region is enormously vast. A flight from Sydney to Tokyo takes about ten hours, from Hong Kong to Mumbai eight. Asia Pacific is also extremely diverse in its cultures and economies. There are enormously sophisticated markets like Japan or Australia. On the other hand there are relatively young economies, just opening up, like Vietnam, where in 2005 Credit Suisse was the sole global book runner of the USD 750 million inaugural bond issue. And then we have countries like China and India, whose inhabitants account for more than 30% of the world's population.

Does the diversity make it more difficult to find the right employees?

Paul Calello: That is one of the great challenges we face: to attract, to hire and to retain the very best in the industry. Banking is a people's business. And it is vital that we keep up the inflow of new but highly talented and competent people into Credit Suisse.

Does our reputation help when hiring people?

Paul Calello: Our reputation is one of our most important assets. Even our closest competitors will respect Credit Suisse as a top brand in the region. Another significant factor is the commitment of the bank to its employees. For example, we have been very successful with our Business School in Asia Pacific. The school is the first organization in Singapore to receive the Financial Industry Competency Standards (FICS) accreditation status from the Institute of Banking and Finance. And in the first six months of this year, the school has had over 10,000 attendees in over 450 unique programs. Clearly the educational possibilities Credit Suisse has to offer are part of our value proposition for potential employees.

"Our reputation is one of our most important assets."

Does the investment in the Business School really pay off? Do our clients profit that much from it?

Paul Calello: They do. We have been most effective in bringing in people who are extraordinarily capable and have them grow within the firm, expose them to the values and the culture of achievement we have at Credit Suisse. But, in addition, we can hone their skills to an outstanding level. This strategy has gained us some of our best employees who in turn provide a premier service to our clients. It also forges a loyalty that helps us retain the very best.

Next to our employees, what can we offer our clients that our competitors cannot match?

Paul Calello: The power of the integrated bank! We draw on everyone's knowledge, experience, professionalism and enthusiasm. As a result Private Banking is working ever more seamlessly together with Investment Banking and Asset Management. The good news is, the gains are very much two-way. Private banking is able to offer our increasingly sophisticated clients individually tailored investment bank services and our investment banking services are complimented by our prowess in private banking.

Can you give us a concrete example?

Paul Calello: Only a few months ago the strength of a client relationship with private banking made it possible for the investment banking team in China to win a placement mandate from a client in the healthcare sector. We successfully priced the follow-on offering for a Nasdaq-listed, Chinese medical supplies company and the transaction was marketed on a five-day bookbuild and priced at a tight discount to the last close. The deal was originally awarded to one of our key competitors. However, Private Banking was able to convince the client to reconsider our expertise. Subsequently, the US healthcare team was instrumental in successfully executing this first healthcare follow-on offering for a Chinese company listed on the Nasdaq. It is a perfect

example because it so clearly shows the strength and the global perspective of the integrated bank.

But hasn't there always been a high permeability between the divisions in Asia? Is this really an achievement of the One Bank Initiative?

Paul Calello: It is all about the synergies of our integrated bank structure! The coordination that is taking place is extraordinary. Since the employees in the region have been brought into the mindset of the integrated bank, we have started to deliver cross-divisional services that are unique in our industry.

"Asia Pacific is creating more millionaires than anywhere else in the world."

What services do private banking clients in Asia expect us to offer – do we just need the best research or are we their trusted advisors in a multitude of areas?

Paul Calello: There are many clients whose needs reach across all divisions. For example, there are a significant number of families that call on our Private Banking services, but also on the services of our Investment Banking and our Asset Management divisions. So we need and deliver not only the best research but also legal and taxation services, mergers and acquisitions, escrow services, holding structures, private funds, capital market transactions, real estate advice, hedging transactions when selling assets – in fact, we seek to offer any service a client needs.

Is there a "prototypical Asian private banking client"?

Paul Calello: Private banking clients in Asia Pacific are of increasing sophistication and they are increasingly global in their perspectives. But there are also strong distinctions. We are the global trusted advisor to some of the wealthiest families in the region, as well as to a new generation of entrepreneurs who earned their multimillion-dollar fortune through their own talents and now seek to expand their business and grow their personal wealth.

Is it true that the number of millionaires in the Asia Pacific region is rising sharply?

Paul Calello: Asia Pacific is creating more millionaires than anywhere else in the world. The growth rate is amazing. One of the recent surveys claims that there are over 2.4 million high-net-worth individuals across Asia Pacific. So, even at an individual level I foresee our clients needing more and more investment banking and asset management advice and services.

How fast is Credit Suisse's growth in the region?

Paul Calello: Over the last few years, our Private Banking unit has doubled the number of people it has hired to about 800. It has also grown very significantly in terms of bottom-line contribution to the firm. Our challenge is in finding and hiring quality people and insuring that we balance the platform and the infrastructure against that.

What expectations do you have in regard to private banking?

Paul Calello: We want to be discerned by our clients as the premier bank in Asia, as a provider of innovative services of the highest quality.

Which strengths will help us to achieve this goal?

Paul Calello: The most differentiating factor is the quality of our staff. It is key to find people who know the markets they are responsible for, have the ability to understand a client's needs and aspirations, but also have a deep understanding of which of the products of our platform fits the needs of the clients. The quality of our services is also based on the depth and

"We must keep on evolving and continue the tradition to innovate."

the breadth of our product range. We have the brand, we have top-quality people, and a better product offering than any other financial institution in the world. But we must not rest on our laurels. We must keep on evolving and continue the tradition to innovate. We have very ambitious growth plans for the region – I am convinced we will achieve them. ■

Photo: Colin Beere

Paul Calello is Chief Executive Officer of Credit Suisse Asia Pacific, based in Hong Kong. He is a member of the Executive Board of Credit Suisse, Chairman of the Asia Pacific CEO Committee, Chairman of the Asia Pacific Philanthropic Committee, and a Trustee of the Credit Suisse Foundation. Paul Calello joined Credit Suisse First Boston (CSFB) in 1990 as a founding member of Credit Suisse Financial Products, the former financial derivatives subsidiary of CSFB. He held several positions heading CSFB's global derivatives operations based in Tokyo, London, New York and Hong Kong.

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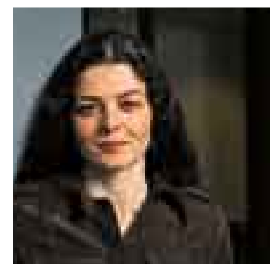

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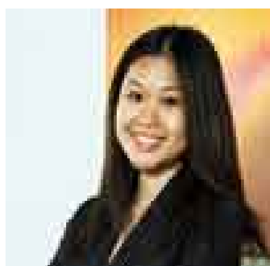

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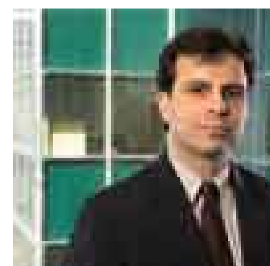

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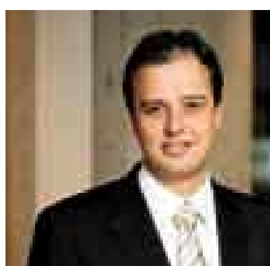

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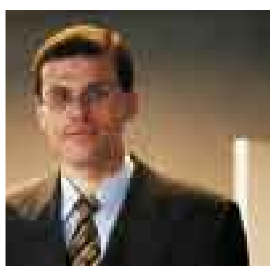

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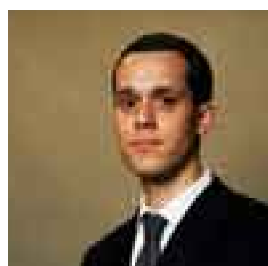

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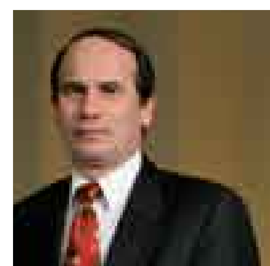

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Disclosure appendix

Analyst certification

The analyst(s) identified in this report hereby certify that views about the companies and their securities discussed in this report accurately reflect his or her personal views about all of the subject companies and securities. The analyst(s) also certify that no part of his or her compensation was, is, or will be directly or indirectly related to the specific recommendation(s) or view(s) in this report.

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Rating Change History 24/08/2006

Company	Rating	Data (since)
AKAMAI TECHNOLOGIES (AKAM)	BUY	01/05/2006
	HOLD	30/03/2006
ALTRIA GROUP (MO US)	BUY	21/04/2005
	HOLD	04/11/2004
	SELL	28/09/2004
	HOLD	09/01/2004
BASF (BAS GR)	BUY	14/09/2005
	HOLD	11/11/2004
	BUY	16/09/2003
BBVA R (BBVA SM)	BUY	08/11/2004
	HOLD	03/11/2003
BHP BILLITON (BLT LN)	BUY	15/02/2006
	BUY	07/03/2005
	HOLD	19/08/2004
	BUY	19/05/2004
	HOLD	28/08/2003
BMW (BMW GR)	BUY	13/04/2004
BRIT AMER TOBACCO (BATS LN)	HOLD	03/05/2006
CADBURY SCHWEPPES (CBRY LN)	HOLD	04/07/2005
	SELL	15/01/2004
CAMECO (CCO CN)	BUY	18/07/2006
CATERPILLAR INC (CAT US)	HOLD	31/05/2006
	BUY	09/02/2005
CITIGROUP (C US)	BUY	20/10/2000
	HOLD	06/01/1999
COCA-COLA CO (KO US)	BUY	08/09/2005
	BUY	16/02/2005
	HOLD	14/01/2005
	SELL	16/09/2004
	HOLD	26/07/2004
	BUY	18/02/2004
COLGATE-PALMOLIVE (CL)	BUY	26/04/2006
	HOLD	14/12/2004
	SELL	16/11/2004
DANONE (BN FP)	BUY	22/02/2006
	HOLD	20/07/2005
	BUY	26/04/2005
	HOLD	15/01/2004
DIAGEO (DGE LN)	BUY	16/02/2006
	HOLD	01/12/2004
DU PONT NEMOURS & CO (DD US)	HOLD	06/02/2006
	N/R	13/09/2005
ENERGY RES AUST -A- (ERA AU)	BUY	18/07/2006
GENERAL ELECTRIC (GE US)	BUY	08/02/2005
GENERAL MOTORS (GM US)	HOLD	25/05/2006
	SELL	11/10/2005
	HOLD	08/07/2005
	SELL	13/10/2004
GOOGLE-A (GOOG)	BUY	27/02/2006
	HOLD	21/11/2005
	BUY	02/02/2005
	HOLD	01/10/2004
HONDA MOTOR CO (7267 JP)	HOLD	27/10/2004
HSBC HLDG (HSBA LN)	BUY	24/02/2006
	HOLD	13/12/2004
	BUY	03/08/2004
	HOLD	14/01/2004
	BUY	05/08/2003
INBEV (INB BB)	BUY	28/02/2006
	HOLD	26/04/2005
	BUY	19/08/2003
KUALA LUMP/KEP/BER/ (KLK/ MK)	HOLD	01/06/2006
	BUY	06/01/2006
KYOCERA (6971 JP)	BUY	23/08/2006
	HOLD	07/03/2006
	BUY	04/10/2005
	HOLD	26/07/2005
	BUY	20/04/2005
	SELL	27/01/2005
	BUY	17/05/2004
L'OREAL (OR FP)	HOLD	10/03/2003
LVMH (MC FP)	BUY	08/03/2002
MATSUSHITA EL INDL (6752 JP)	BUY	03/02/2006
	HOLD	21/07/2005
	BUY	17/12/2004
MITSUI & CO (8031 JP)	BUY	12/04/2006
NESTLE N (NESN VX)	BUY	15/01/2004
	HOLD	16/09/2003
NEWS-A (NWS/A)	BUY	17/05/2006
NOKIA (NOK1V FH)	BUY	11/04/2006
	HOLD	09/06/2005
	BUY	27/01/2005
	HOLD	07/04/2004
	BUY	09/01/2004
OPAP (OPAP)	BUY	09/05/2006
PEPSICO (PEP US)	BUY	04/01/2005
	HOLD	21/04/2004
PERNOD RICARD (RI FP)	HOLD	09/02/2006
	BUY	07/02/2005
	HOLD	28/04/2004
SABMILLER (SAB LN)	HOLD	02/12/2004
	BUY	01/09/2004
SHANGHAI ELECT -H- (2727 HK)	BUY	24/05/2006
	SELL	23/02/2006
	HOLD	27/01/2006
	BUY	20/07/2005
SHARP CORP OSAKA (6753 JP)	HOLD	14/12/2005
	BUY	17/08/2005
	HOLD	25/07/2005
SHISEIDO CO LTD (4911 JP)	HOLD	17/05/2006
SONY (6758 JP)	BUY	15/03/2005
	HOLD	24/04/2003
	BUY	25/04/2002
THE SWATCH GRP (UHR VX)	BUY	24/08/2006
	HOLD	17/05/2006
	BUY	24/02/2003
TOYOTA MOTOR (7203 JP)	BUY	09/02/2006
	HOLD	06/10/2005
	BUY	06/02/2004
UNILEVER CERT (UNA NA)	HOLD	30/07/2004
	BUY	27/08/2003
VIACOM-B (viab)	HOLD	05/01/2006
WALT DISNEY (DIS US)	BUY	11/02/2005
	HOLD	13/10/2004
WASTE MANAGEMENT (WMI)	BUY	04/04/2006
WILLIAM HILL (WMH LN)	BUY	09/05/2006
YAHOO (YHOO US)	BUY	18/01/2006
	HOLD	21/11/2005
	BUY	19/03/2004

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	Overall	With investment interests only
BUY	47.00%	47.87%
HOLD	48.31%	47.42%
SELL	3.93%	3.82%
RESTRICTED	0.75%	0.90%

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At the stock level, the selection takes into account the relative attractiveness of individual shares versus the sector, market position, growth prospects, balance sheet structure and valuation. The sector and country recommendations are "overweight," "neutral," and "underweight" and are assigned according to relative performance against the respective regional and global benchmark indices.

Absolute performance

The stock recommendations are BUY, HOLD and SELL and are dependent on the expected absolute performance of the individual stocks, generally on a 6–12-month horizon based on the following criteria:

BUY	10% or greater increase in absolute share price
HOLD	–10% / +10% variation in absolute share price
SELL	10% or more decrease in absolute share price
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TERMINATED	Research coverage has been concluded.

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For a short introduction to technical analysis, please refer to Technical Analysis Explained at: https://entry4.credit-suisse.ch/csfs/research/p/d/de/techresearch/media/pdf/trs_tutorial_en.pdf

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