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and world leading experts

**Intangible  
Infrastructure**  
The key to growth



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The Credit Suisse Research Institute identifies and provides insights on global themes and trends. Its first research report focuses on intangible infrastructure and its role on sustainable growth.

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The Intangible Infrastructure report which follows exemplifies this new approach. In this publication, we integrate the work of over 60 Credit Suisse analysts and external experts from across the globe to assess the impact on growth of the five key intangible infrastructure factors. This is the first time that the effect of the intangible infrastructure factors we identified is measured and quantified in a comprehensive way across sectors and regions. We look at both the status quo and the potential for further investment in these areas.

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## Executive summary

This report focuses on what we believe will be a shift in investment priorities at the national and corporate level toward the underlying "intangible infrastructure" within an economy, particularly within the emerging market world. That is to say the knowledge-driven areas such as education, healthcare and technology that help diversify growth and improve competitiveness, rather than simply the "tangible" roads and railways that provide the initial platform for growth. The latter was the driver behind the last cycle, and we believe the former will be crucial in securing progress in the next.

This view is underscored by the prevailing global financial crisis and economic downturn, since the extent and design of intangible infrastructure goes some way toward explaining the fragility of various economies. The importance of intangible infrastructure has been emphasized by Barack Obama's many references to spending on education, healthcare and innovation in recent speeches, and in spending plans announced by countries as diverse as China and the United Arab Emirates (UAE).

We have pursued this theme at a top-down and bottom-up level. We have used the input of our macroeconomists and strategists to test the hypothesis and, importantly, seek to quantify the relevance of these intangible factors. To do so, we have created the Credit Suisse Intangible Infrastructure indices, which allow us to rank countries and chart their development around five related pillars – (1) education, (2) healthcare, (3) the development of the financial system, (4) technological investment and (5) the penetration of business services. They highlight the gaps that exist within the infrastructure of the new economic "super-powers" such as Brazil, Russia, India and China (the BRIC countries). Education emerges as a key driver of growth and an area that has been relatively neglected by some emerging markets. We believe there is significant potential for growth in the sector and we can already see stated government priorities moving that way.

At a bottom-up level, we have drawn off the breadth of our global research coverage to focus on investable stock opportunities. Our global analysts have provided their perspectives on companies that offer the greatest growth potential as investment in the five pillars of intangible infrastructure becomes a more obvious feature. Clearly, we are in many cases balancing factors like high discount rates and cyclical pressures on profitability that many companies are currently facing against the structural opportunity we envisage.

Drilling down, we have put together the "Credit Suisse Intangible Infrastructure Top 20," a focused list of our covered stocks offering the best growth potential within each pillar. Details of the stocks in the Top 20 are available from your Credit Suisse Relationship Manager.

The nature of the list per se makes an important point. While the theme typically leads one to think about the emerging world, there is a key relevance for stocks in developed markets as well. First, they possess unique expertise that may be exported to assist with the investment we are expecting. Second, the intangible infrastructure in the developed world still offers scope for improvement with further globalization, outsourcing and more general technological investment presenting opportunities.

## Overview

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### Intangible infrastructure – building on the foundations

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Global investment in physical infrastructure has been one of the most enduring investment themes over recent years (power generation, construction, transportation to name a few). Specifically, it has been a prime driver of growth in the emerging markets and served as an earnings boost for the companies in the developed world who have served these markets, particularly in the capital equipment and commodity sectors. However, we believe that from here the term "infrastructure" should be considered in a two-dimensional sense.

Roads, railways and power stations clearly form the bedrock for the development of an economy and in that respect represent essential "tangible" infrastructure. However, this alone is not sufficient to sustain growth beyond its initial phases. In fact, in the current climate, we have begun to see the impact on growth in a number of emerging economies that have rested too heavily on such factors, as credit has become less freely available and commodity prices have weakened in particular. Elsewhere, some emerging economies were already reaching a level of maturity that required a shift in investment patterns in order to make the transition from a primary or low cost manufacturing base to a more tertiary and higher value-added-based economy.

To achieve broad and sustainable growth, we believe that infrastructure of a more "intangible" nature needs to be present or developed, as we explore in the following pages. We look for features, perhaps more service-sector-oriented and socio-economic in their nature, that lead to a deepening of the growth potential of a country, widening its base and, importantly, insulating it to some degree from the severity of shocks of the nature we are currently experiencing. Our analysis still shows the new found "economic super powers" such as the BRICs still lack much of this architecture.

That is not to say that the physical theme is over in every instance – it still remains a major story in the Middle East and China. For instance, China's underleveraged fiscal position should allow it to increase public spending in this arena to offset the current downturn during 2009/2010. However, in these cases, we expect an important complementary role to be played by investment in intangible infrastructure. In other regions, investment in intangible infrastructure may well become a more dominant theme. While we expect this will largely be an emerging market theme, there are opportunities for companies in the developed world who have expertise they can export to these countries keen to acquire it.

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### What is intangible infrastructure?

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In this report we have defined intangible infrastructure as "the set of factors that develop human capability and permit the easy and efficient growth of business activity'." These factors can be essentially political, legal or socio-economic in nature. Examples of political factors include the degree of political stability or the strength of the institutional framework. Legal factors include the rule of law, tax policies and intellectual and physical property rights protection. Examples of socio-economic factors include research and development capabilities, business processes or employee training and education.

For the purposes of this report, we have considered five specific components of intangible infrastructure – education, healthcare, finance, business services and technology. This may not represent every element of the story, but probably reflects the most relevant aspects from an investment perspective:

#### 1. Education

We focus on education as it is a key determinant of human capability. The value of education is intrinsic in almost all levels of economic output. As we illustrate in Figure 2, and discuss in more detail later, the correlation between educational attainment and GDP per capita is particularly strong. We can also track the historical precedents of economies, such as the early "Asian tigers" whose emphasis on investing in education paved the way for their success. Government commitment to education can be shown to have a significant impact on the nature of growth that economies then display, as much as the GDP level itself. It is important to be conscious of the

examples of best practice among the prevailing suppliers of private education in the developed world as they will potentially influence its development – whether directly or indirectly – in the emerging world. This could be at any point of the education chain, from primary to as advanced as universities and business schools.

## **2. Healthcare**

With considerations such as life expectancy and related demographic trends, healthcare is another key factor in determining the average individual's output. Through time and across borders, there are very few exceptions to the rule that better healthcare fosters an environment of higher economic activity as well as human development. Despite this fact, it has not been a priority in many of the markets that we currently view as high growth markets such as China. This looks set to change.

## **3. Finance**

The financial sector is central to determining the "easy and efficient growth of business activity." There has rarely been a time when this point has been more relevant than today. This sector is a prime example of the power of intangible factors. Just as the financial system itself is an "intangible" intermediary for growth, the intangibles of regulation, standards and, of course, intervention drive the evolution of financial systems. They are decisive in determining why some countries have strong financial sectors and others weak ones. At one end of the scale, lack of access to credit is inhibiting growth while, at the other end of the scale, severe economic difficulties can be created and exacerbated by under-regulated and overstretched financial institutions. This was well illustrated by the emerging markets crisis in the mid/late 1990s as well as the prevailing credit crunch in the developed markets. We are particularly interested in the development of financial systems in emerging economies.

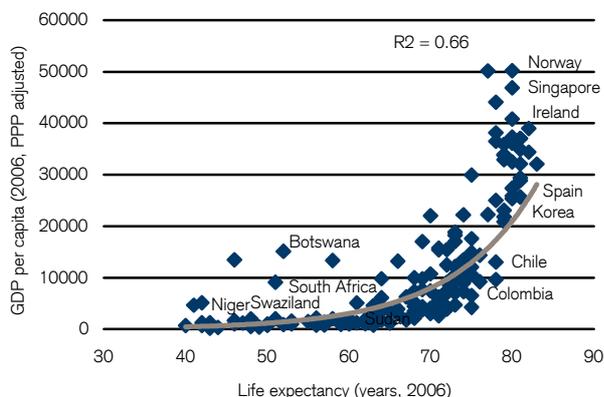
## **4. Technology**

The technology sector, perhaps more than any other, permeates and influences many aspects of nation-building as its implementation represents not only a stand-alone category, but also has the potential to significantly impact the other categories within our definition of intangible infrastructure. Ostensibly, we are interested in the more intangible elements of technology; for instance, software solutions or system processing capabilities. In practice, it is impossible to disaggregate software from hardware and, hence, we look at aspects of both in our discussion. "Virtualization," which is the use of software to allow hardware to run multiple operating system images at the same time, is a good example of the type of technological advances we are seeking to identify. As a means of increasing capabilities without incurring the expense of upgrading physical infrastructure, virtualization, in theory, can foster more profitable growth and maximize economic value-added. While hardware may be at the heart of its application, communication by nature is an intangible necessity and we consider its role here. More generally, the ability to access the most recent technology presents an opportunity for emerging economies to fast-forward their development relative to their developed peers.

## **5. Business services**

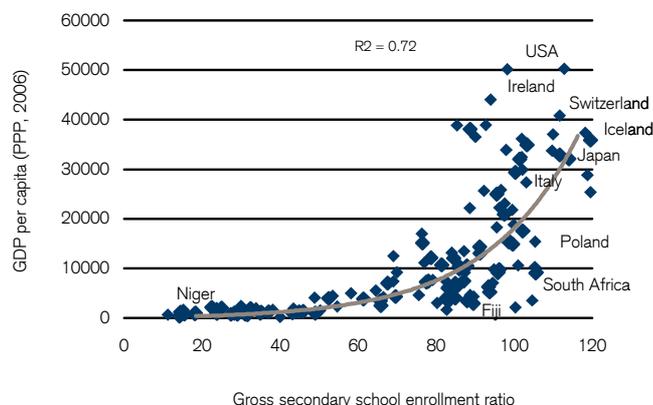
This sector forms an important support structure for economic growth, enabling companies to function in a more efficient and competitive way. Specialist services like IT, logistics or recruitment, which can in theory be done in-house, in practice allow companies to concentrate more on core businesses while depending on trusted experts for other activities. Typically, we have found that the greater the penetration of business services, the higher the GDP per capita. It is a theme of relevance in the developed as well as the developing world, but with a different emphasis. It is an area where the developed world can clearly export its best practices (such as payment and employment services). Indeed, if the emerging world is to trade with the developed world, it has to operate by the same standards – standards set and typically measured by developed global companies. However, we believe that in the developed world itself, this form of intangible infrastructure still has scope for growth in its own right, as secular themes of outsourcing, labor deregulation and global trade remain.

**Figure 1**  
Life expectancy vs. GDP per capita



Source: IMF, Credit Suisse

**Figure 2**  
Secondary school enrolment vs. GDP per capita



Source: UNESCO, Credit Suisse

**Theory and practice**

**Intangible infrastructure is interdependent and interlinked**

While we have sought to categorize the nature of intangible infrastructure in these five categories, in reality, it is far more complicated than that. It is of course heavily inter-related and interdependent. It is not impossible, but it is highly unlikely that any country with a high degree of technology penetration would not also have a fairly comprehensive education system. In the same way, financial systems would struggle in the absence of a legal framework and advances in technology might falter without property rights to support the R&D. The absence of one element may make a country more reliant on acquiring an aspect of another; for example, a lack of educational infrastructure might lead to a need for more business services – and so on.

Strictly speaking, it is the law, regulation and structure of the sectors we have set out that comprise their "intangible" qualities. In practice, since "intangible" implies difficult to measure, it is only through obvious penetration or attainment standards that we can gauge the development and growth potential of the overall intangible infrastructure. For instance, the potential (and actual) productivity of the workforce is probably well correlated with tangible measures of education and health such as secondary school enrolment and life expectancy statistics. The strong fit between these two respective measures and GDP per capita suggests this is indeed the case.

Adding support to the case for "intangible infrastructure" are the broad trends in demographics, economics, society and geopolitics that point toward the rising importance of intangible factors, as well as the significant body of academic literature on economics and development.

**The "spill-over" effect**

Nobel prize-winning work by Robert Solow has helped to structure ideas on the role that technology and human capital play in generating economic growth. In turn, this has paved the way for theories that map out the means by which developing countries could "catch up" to wealthier ones. The ability of a country to catch up to other better-off ones is largely a function of factors like technology "spill-over," and the extent to which this can be absorbed and adapted by the workforce. This "spill-over" can come in the form of the export of expertise from one country to another through the likes of FDI or training programs, or implicitly through the straightforward reproduction of designs and processes. In this report we highlight specific technologies and companies that are currently doing just that: whether it be the likes of virtualization software providers or, say, the business services providers of legal and regulatory advice.

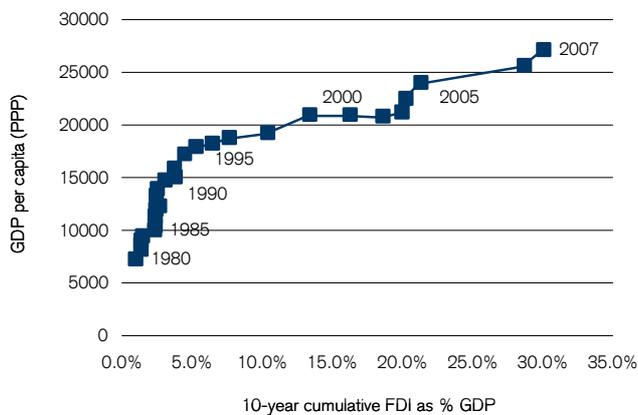
**Korea and Israel illustrate the "spill-over" effect**

Two clear beneficiaries of the "spill-over" effect have been Israel and Korea. Twenty years ago, both were clearly categorized as emerging markets (with GDP per capita of USD 2,369 for Korea and USD 6,793 for Israel in 1985, according to IMF data). Since then, gross foreign direct investment in Korea has averaged 0.6% of GDP p.a. and in Israel 2.0% of GDP p.a. Among other things, this has facilitated significant convergence in GDP per capita to the levels associated with developed markets.

**Patent filings – an "intangible" metric?**

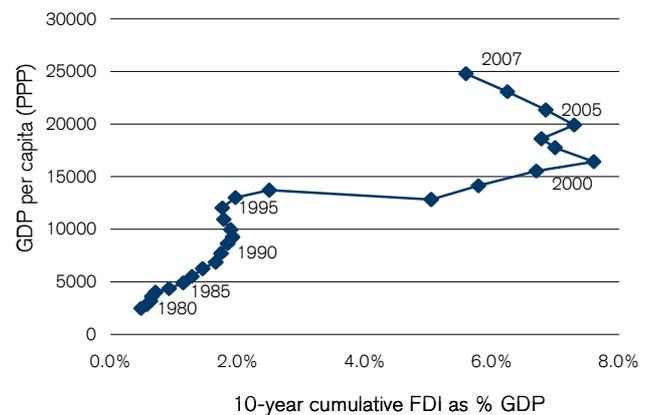
The notion of "catch-up" is also borne out by the data on patent filings from the World Intellectual Property Organisation (WIPO). In the charts below, we show the number of annual patent filings for the USA, Japan, Brazil, Russia, India and China in total, and the split between resident and non-resident filings. We make four observations:

**Figure 3**  
Israel: gross FDI and GDP per capita



Source: IMF, IFS, Credit Suisse

**Figure 4**  
Korea: gross FDI and GDP per capita



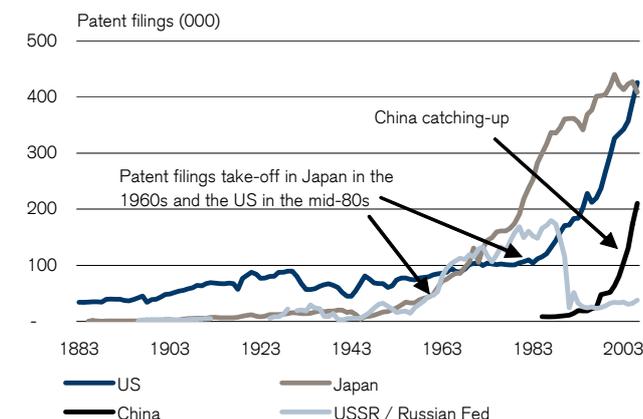
Source: IMF, IFS, Credit Suisse

1. The inflexion point in the growth of patent filings in the USA (mid-1980s) and Japan (the early 1960s) coincides with a boom in their rates of productivity growth.
2. The growth rate in patent filings in China (21% in 2006) and more recently Russia (17% in 2006), India (40% in 2005) and Brazil (20% in 2006) is very strong. This suggests their own rate of productivity growth is likely to be strong and that these countries are catching up remarkably quickly to developed markets on the back of more open economic policy and the trend towards globalization.
3. These trends are not simply driven by developed market companies filing old patents in new countries. Over half the patent filings in Russia and China are entered by residents rather than non-residents.
4. Perhaps not surprisingly, the upswing in patent filings has corresponded with better stock market performance.

**Educational impact – a key "measurable"**

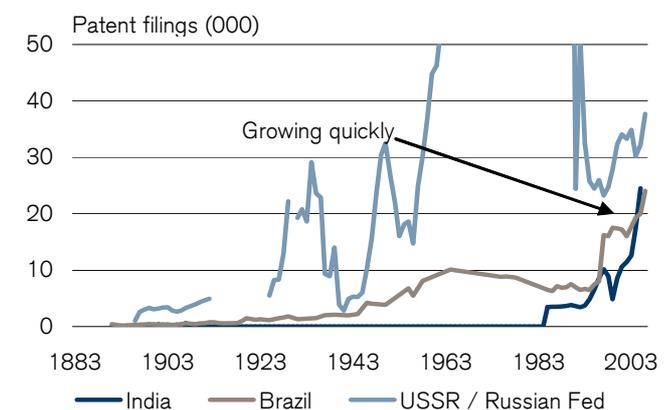
Other economists such as Robert Lucas and Robert Barro have focused on education as a key driver of growth and used it to explain differences in the growth rates between countries. Since then, it has been routinely included by researchers in models studying growth from various perspectives. We include simple examples that illustrate such thinking below.

**Figure 5**  
Trends in patent filings: USA, Japan, China and Russia



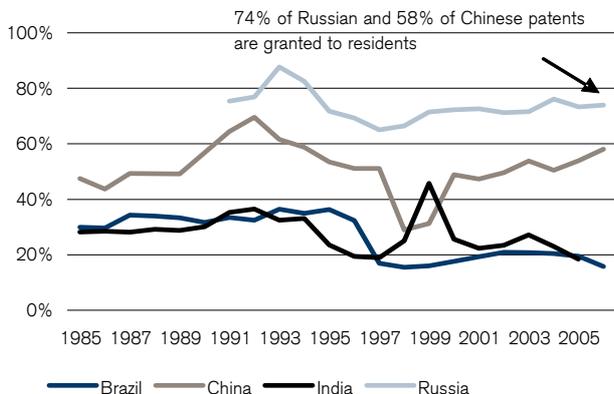
Source: WIPO, Credit Suisse

**Figure 6**  
Trends in patent filings: Russia, Brazil and India



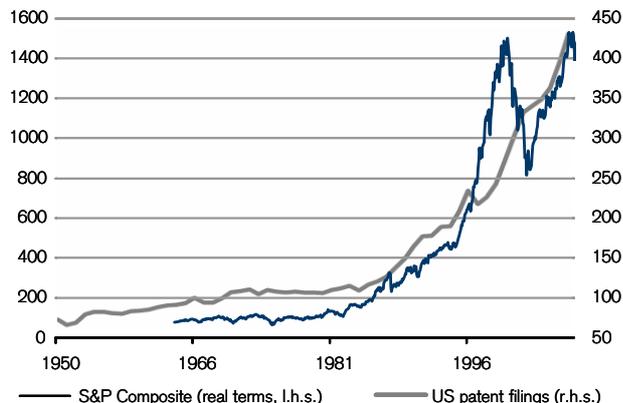
Source: WIPO, Credit Suisse

**Figure 7**  
Trends in patent filings: Resident filings as a % of total filings



Source: WIPO, Credit Suisse

**Figure 8**  
US patent filings and S&P performance



Source: WIPO, S&P, Credit Suisse

In Figures 9 and 10, we can track close relationships between high school completion in the USA and university education in Japan with GDP per capita. The differing experience among still emerging and "emerged" markets and economies can also be linked to educational attainment and government commitment.

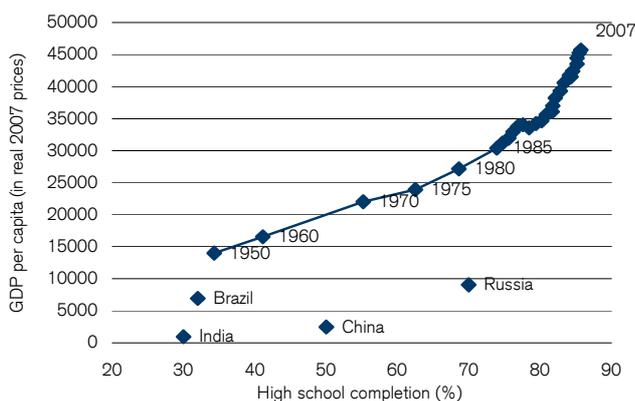
**Asia left Latam behind with education**

Differences in the Latin American and Asian growth experiences of the last thirty years can partly be explained by differences in the extent and quality of education. In 1970, 16.8% of the Latin American population over 15 years of age and 15.7% of the equivalent Asian population had completed secondary education. By 2000, the Asian emphasis on education meant that this had increased to 44.4% of over 15 year olds compared to just 35.8% in the case of Latin America. Real GDP growth averaged 8.1% and 3.5% for Asia and Latin America, respectively, between 1970 and 2000.

**Plenty of scope for education-led growth in BRIC countries**

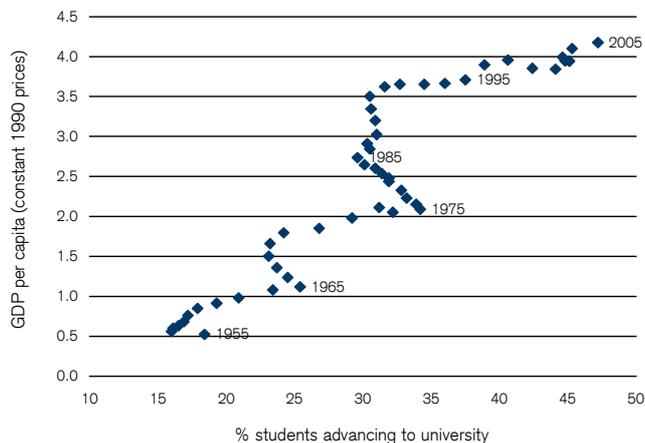
If we compare current figures for the larger emerging markets it suggests there is plenty of scope for growth if they are able to emulate the success of developed markets such as the USA and Japan. The high school completion rate in China was roughly equivalent to that of the USA in 1965; India and Brazil have levels similar to that of the US pre-1950; Russia is comparable with the USA around 1980. A point that also emerges from our sector analysts' views is that a combination of greater educational attainment and investment in the latest technology can significantly shorten the "catch-up" process.

**Figure 9**  
US GDP per capita vs. high school completion rates



Source: US Department of Commerce, Datastream, UNESCO, Credit Suisse

**Figure 10**  
Japan GDP per capita vs. % of students advancing to university



Source: US Department of Commerce, Datastream, UNESCO, Credit Suisse

**Figure 11: Asia vs. Latin America: education and growth**

	Asia (ex Japan)	Latin America
% of over 15 year-old population that has completed secondary education		
1970	15.7%	16.8%
1980	26.9%	23.3%
1990	37.4%	29.6%
2000	44.4%	35.8%
Avg real GDP growth (1970 – 2000)	8.1%	3.5%

Source: Barro-Lee data, IMF, Credit-Suisse

**Stability not democracy**

**It does not have to be "fair"**

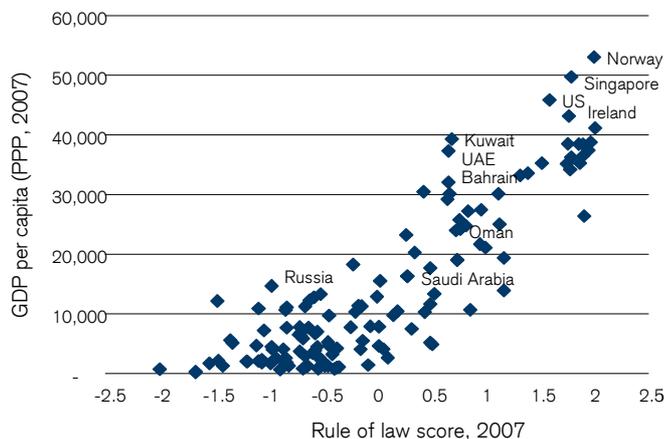
We note that the notion of a "fair society" is not necessarily a prerequisite for intangible infrastructure to function.

In the political-economic field, a good deal of the academic literature that links income and economic growth to "intangibles" has focused on democracy. At a broad level, the relationship between democracy and development is a close one, though the causality of this relationship is increasingly being questioned. Instead, the emerging consensus is that institutions and intangible factors like the rule of law matter more for economic development than democracy itself.

Asia is a good example here. The "Sinatra" doctrine ("do it my way") of the highly globalized Asian states like Hong Kong and Singapore and of course China, has seen highly successful economies built not in a democratic environment but in the context of centralized control structures. The example of the wider Asian region also shows that the existence of a functioning democracy is not a necessary factor in economic development. However, what does appear to be key is some form of "order" or institutional structure that can drive change through an economy.

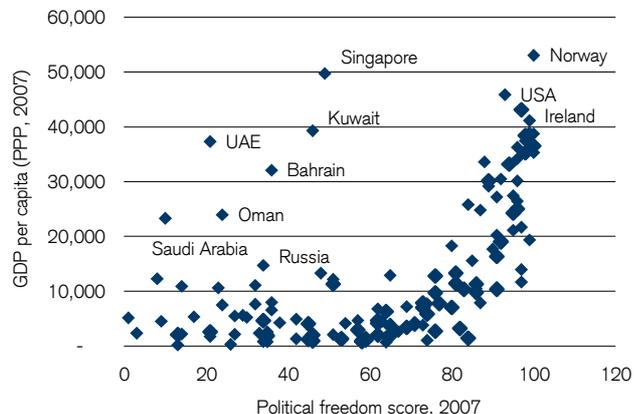
Our own findings suggest that institutions, or at least the quality of institutions, drive the distribution of resources in an economy and the way incentives and contracts are set up. Decent institutions encourage trust, investment in human capital and help to lower the frictions of doing business. A simple illustration is to compare the fit of GDP per capita with (a) World bank data that scores the Rule of Law in each country and (b) Freedom House data on the scope of political freedom. The data clearly shows that the rule of law (R-squared of 0.67 with GDP) is far more important as a determinant of economic success than political freedom (R-squared of 0.28 with GDP).

**Figure 12**  
Rule of law score vs. GDP per capita (PPP)



Source: World Bank, IMF, Credit Suisse

**Figure 13**  
Political freedom score vs. GDP per capita (PPP)



Source: Freedom House, IMF, Credit Suisse

## Why is it relevant now?

While the elements of intangible infrastructure are perhaps compelling drivers of long-term growth, the key question is "why is it important now?" We see a series of factors why such expenditure is likely to grow strongly in the emerging world in the years ahead, factors that have in many ways been underscored in their significance by this year's market turmoil.

### 1. Government priorities

However important we believe this topic is, more importantly, we can now see that various governments in the emerging economies recognize the merits of achieving greater stability and more economic breadth and that, in order for this to be self-sustaining, it will require significant investment in intangible infrastructure. China, Brazil and Russia have recently announced sizeable infrastructure spending programs, aimed not just at adding to tangible infrastructure but focused on advances in science and technology, improvements in the quality of the workforce, and innovation in management. In particular, Saudi Arabia and the UAE have prioritized education in their latest budgets, setting aside more than a quarter of 2008 expenditure for the development of human resources and scientific and technological research.

### 2. Financial strength and flexibility

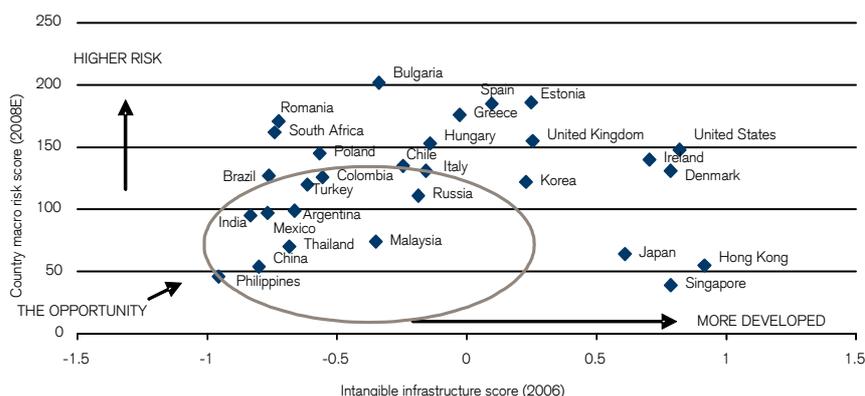
The credit crisis, among other things, has underscored the importance of strong government finances. Our view is that Asia and much of Latin America, as well as Russia look better placed to weather the prevailing economic storm than most of the rest of the world. Obviously, some elements of the emerging markets continue to be very vulnerable to the credit crunch (Bulgaria, Estonia, South Africa and Hungary). In Figure 14, we have combined a country risk score (on the basis of current account position, external debt ratios, loans to deposits and commodity exposure) with an aggregate score to summarize the extent of intangible infrastructure development. The chart highlights how many of the key emerging markets (including Brazil, Russia, India and China) offer a combination of low macro risk and low intangible infrastructure development, suggesting both ability and scope to grow the latter. Underpinning resilience in many of these economies are strong fiscal positions.

### 3. Competitiveness

Notwithstanding recent foreign exchange movements, there has been appreciation of many key emerging market exchange rates over the past five years, posing issues of competitiveness. Offsetting these higher prices and sustaining growth requires a rise in productivity to increase output and/or the degree of value-added. And productivity, in the form of a better qualified and more efficient workforce is, in turn, a function of "intangible infrastructure." There is plenty of evidence that competitiveness is being eroded in key markets.

Fiscal balances underpin the financial strength

**Figure 14**  
Macro risk vs. intangible infrastructure development



Source: Credit Suisse

**Consumer "tipping point"**

**4. Affordability**

Of course the moves in real exchange rates are in part mirrored in the improvement in living standards through higher wages. Many large emerging markets are now poised to make the next "structural" step in their socioeconomic development – from "basic needs" type societies to more sophisticated consumer-based societies.

In the last three years, there has been a marked acceleration in the number of emerging markets and the number of people that have tipped over the USD 5000 per head threshold (on a PPP basis). This is the level at which we can observe a step-up in consumer demand from purely basic needs to more broad-based consumption of goods and services, such as better healthcare and education and more sophisticated financial services and consumer technology.

**5. Globalization and access to capital**

If we define globalization as the growing interdependence and integration of markets, economies and societies, then by extension much of globalization rests on the spread of "intangible" factors like international institutions, the spread and patenting of ideas, financial innovation and the diffusion of cultural trends. Among other things, globalization breaks down barriers to the flow of services and information, and helps to relegate geography as a driving factor in economic development. In this respect, intangible factors like education, investment in research, healthcare, technology, efficient and transparent financial institutions play a key role.

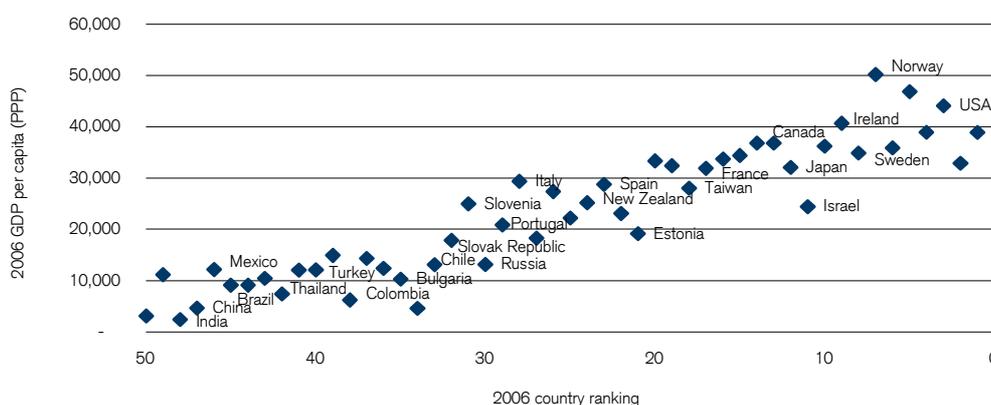
**Measuring intangible infrastructure**

**Back to boom/bust?**

In order to statistically gauge the degree and effect on growth of intangible infrastructure, we have created the Credit Suisse Intangible Infrastructure Index as a means to rank countries and perhaps more importantly track their improvements going forward. In keeping with the five pillars of the report, the index is split into the categories of education, technology, healthcare, financial services and business services. We have constructed a Credit Suisse Intangible Infrastructure subindex for each category and a composite Credit Suisse Intangible Infrastructure Index that encompasses all five subindices. In each of the sector sections of the report, we provide details on how countries rank within this framework.

We adopted two methods to overcome difficulties with measuring "intangible" concepts: (a) through the use of surveys, which we have labeled "soft" data. For example, we have integrated qualitative scores on the perception of financial transparency or the ease of credit flows into our Credit Suisse Finance Index, and have used survey data on whether or not information technology skills are seen as readily available in the construction of our Credit Suisse Technology Index. (b) We have used "hard" or factual datasets that reflect the state of intangible infrastructure. For example, we have incorporated the non-performing loan ratio into the Credit Suisse Financials Index since, to some extent, this reflects the degree and quality of bank sector regulation. We have two caveats with respect to the index:

**Figure 15**  
CS Intangible Infrastructure ranking vs. GDP per capita (PPP, 2006)



Source: Credit Suisse

1. The dataset is only complete for all countries up to the end of 2006. It would, of course, be preferable to have more recent data, but we find that the fabric of any one country's intangible infrastructure does not change that much from one year to the next. Hence, we are confident that the relative ranking of intangible infrastructure in 2006 is still relevant today.
2. The input variables used to construct each index may or may not have been the most appropriate. For instance, a high ratio of credit to GDP does not necessarily imply an appropriate degree of intangible infrastructure within the banking sector. Nevertheless, we are encouraged by the overall result for the index, which correlates well with levels of GDP per capita.

We would highlight the following features:

### 1. Statistically significant impact

Regression of Credit Suisse indices on GDP per capita growth rates does yield significant results and thus backs our thesis. Our model shows that a one point increase in the Credit Suisse indices raises per capita growth by 0.01–0.02 percentage points for our group of countries, depending on the specific index. Statistically, it is a robust finding, but also conceptually. We remain mindful that many variables enter the equation of measuring economic growth and therefore only a very large move in the Credit Suisse Intangible Infrastructure Index will show an impact on growth. The impact on GDP per capita growth is stronger for developing than for industrial countries. For example, the impact of the total Credit Suisse Intangibles Index on Aggregate Growth is 0.03 (R-sq=41%), with the impact on developing countries being 0.035 (R-sq=48%) and for developed countries being 0.012 (R-sq=39%). In other words, our analysis suggests that the incremental benefit of an additional unit of intangible infrastructure investment on economic growth is larger for emerging countries than for industrial economies.

### 2. Country ranking

Using the index, we score the quality of intangible infrastructure in each category by country and by year – from 1999 to 2006 – out of a total sample of 50 countries. We find the top ten countries as being Finland, USA, Hong Kong, Singapore, Sweden, Denmark, Japan, Norway, Israel and Switzerland. The ranking is not a surprise. It underscores the implicit role of intangible infrastructure in achieving economic success. The correlation between the index and the level of GDP per capita per year encapsulates the relationship between intangible infrastructure and a country's level of economic activity and wealth creation. The result confirms the strong link between intangible infrastructure and the level of economic activity. For the six-year period, the correlation is a solid 91%. But rather than just the static scores, the trends in the rankings are the key focus for us.

### 3. Education and technology appear to be key

We can gauge the relative importance of the five different subindices. The results suggest education and technology are potentially the most important. To do this, we have used Spearman's rank correlation coefficient. As we show in the table below, it is the ranking in the education and technology sectors that correlates most highly with the ranking in the other sectors. In other words, the higher any one country is rated in education and technology, the more likely it is that this country will also perform well in terms of financial services, business services and healthcare. Healthcare has the lowest correlation, on average, with the other sectors (i.e. a high rating in healthcare is the least likely to imply high ratings in the other sectors).

**Figure 16: Spearman's rank correlation co-efficient\*: 2006 data**

	Education	Healthcare	Financial	Technology	Business services	Average
Education	1.00	0.72	0.77	0.85	0.80	0.83
Healthcare	0.72	1.00	0.62	0.75	0.55	0.73
Financial	0.77	0.62	1.00	0.77	0.76	0.78
Technology	0.85	0.75	0.77	1.00	0.84	0.84
Business services	0.80	0.55	0.76	0.84	1.00	0.79

Source: Credit Suisse  
\* the closer to 1, the more significant the result.

#### 4. Where is the catch-up potential?

In Figure 17, we highlight those countries that offer a combination of (a) a current low ranking on the index (rated worse than 20 out of 50) and (b) an improvement of momentum in relative rankings (comparing the ranking in 2006 with that of 1999). In line with this analysis, the countries that have reasonable prospects for growth in intangible infrastructure are: India, Korea, Brazil, Chile, Colombia, Venezuela, Czech Republic, Russia, Turkey and South Africa.

#### 5. What about the BRICs?

A key observation, in our view, is how much further progress the BRIC economies can and need to make in terms of their intangible infrastructure. Of the four BRIC markets, Russia has the best momentum and the highest 2006 ranking (30 out of 50). This has been driven by considerable improvement in the Russian ranking in our Credit Suisse Technology Index and small improvements in its ranking for business and financial services. Albeit from a much higher relative base, Russia has lost some ground in healthcare and education relative to the other main emerging markets. Brazil has crept up one place (from 46 to 45) between 1999 and 2006 in our overall intangible index. The improvement has come courtesy of healthcare (up five places from 50 to 45 as of 2006). India has also eked out a small improvement in its overall position within the index between 1999 and 2006, although as of 2006 it was still languishing down at 48th place.

Large improvements in its ranking in the education and finance subindices were mostly offset by a surprisingly disappointing performance in its technology ranking. While growth in absolute technology expenditure in India has been substantial over this period, relative per capita penetration rates have not outstripped the growth recorded in other emerging markets. This suggests considerably more growth in technology-related demand as GDP per capita increases. China is fairly lowly rated (47 out of 50) on the latest data in our overall intangible index. Momentum has been poor; it has actually slipped two places since 1999. This probably reflects greater government focus on physical rather than intangible infrastructure over the last five years. This situation looks set to change given (1) government commitment to intangible factors (as above) and (2) bottom-up forecasts, where our analysts suggest considerable growth particularly in technology, healthcare and education in China over the next five years.

**Figure 17: Country rankings (2006) and change in ranking (1999–2006)**

	Improvement in ranking (1999–2006)	2006 ranking (out of 50)
Colombia	9	38
Korea	7	22
Czech Republic	6	25
South Africa	3	44
Turkey	3	40
Russia	2	30
Brazil	1	45
Chile	1	33
India	1	48
Venezuela	1	49

Source: Credit Suisse

## From top down to bottom up...

In the following section, we look specifically at the background, market structure, regulatory drivers and growth outlook of the five intangible infrastructure pillars, drawing from the feedback of our analysts. We focus primarily on the emerging markets, where we see the best growth potential, but have also included a discussion on developed market stocks that either offer strong emerging market exposure or a guide to best practice. Remember, we see many instances in which the developed world will export its service-sector-oriented skill sets. We find that growth projections vary significantly between the sectors, and by region and country.

### 1. Education

Education is arguably the most significant piece of this intangible jigsaw. This perhaps underscores the high rankings that the developed countries receive, given that they dominate global spending on education.

However, in our view, the outlook for growth in education is now much more favorable in the emerging markets than it is for the developed markets. There are four main reasons why: growth in the school age population is faster (2.3% versus -1.3%, respectively, over the next eight years), prevailing enrolment ratios are typically much lower (tertiary enrolment of 41% versus 70% on average), forecast GDP growth (as a proxy for disposable income) is higher and fiscal positions are stronger. In addition, the emphasis that certain emerging market governments (including China, Russia and Saudi Arabia) are placing on the importance of education is encouraging. We find that India, Saudi Arabia, China, SE Asia, Venezuela and Brazil offer reasonable prospects for increased education spending. Of relevance to investors, of course, is that an increasing provision of this education is taking place outside of the state sector. Meanwhile, with declining school age populations and limited scope for enrolment ratios to increase further, the growth outlook for the education sector in some of the large developed markets (the UK, Spain, Japan and France) looks relatively poor. The USA is perhaps the exception to this rule.

The key merits of the listed companies in this sector are the high barriers to entry, lack of cyclicalities in revenues, high margins and strong free cash-flow conversion. We forecast growth rates well into the double-digits for all the listed emerging market stocks included in our coverage universe.

### 2. Healthcare

Globally, we estimate that healthcare is a USD 5.4 trillion business equivalent to around 10% of total GDP, but dominated by spending in the developed world – 85% of the total in 2005, despite accounting for only 36% of the global population. However, while the bulk of healthcare expenditure is concentrated in the developed markets, absolute growth has been strongest in the emerging markets (up 72% versus 50% for the developed markets between 2000 and 2005, according to the World Health Organization). We think this should remain the case.

In the aftermath of the emerging market crisis of the late 1990s, healthcare took something of a back seat on the government reform agenda as other matters (banking regulation or external debt financing, for example) took priority. Compared to developed markets, the data clearly illustrate lower levels of healthcare spending in most emerging markets and a lower proportion of government healthcare expenditure.

However, more recently, healthcare has moved up the priority list in key emerging markets such as China, Brazil and South Africa. In China, for instance, we expect government-led spending on healthcare to boost healthcare expenses as a percentage of GDP from 5% in 2005 to 10% by 2015. Admittedly, government-led growth in healthcare is hampered by significant public sector financing constraints (for example, in India), but even here we expect growth to be buoyant, driven by private, out-of-pocket sales.

Given the financing constraints on governments, demand is focused on lower-cost solutions. This clearly favors generic players. In some cases (Brazil, South Africa, India), governments are explicitly targeting higher generic sales. The private providers of healthcare services are also likely to be a key component in improving provision.

Absolute growth in healthcare spending has been strongest in the emerging markets (up 72% versus 50% for the developed markets) between 2000 and 2005. Bottom-up forecasts suggest continued strong growth (despite the global slowdown) in emerging market healthcare.

### 3. Finance

It is a tale of two halves: one half of the world is underleveraged (Latin America, most of the EMEA, excluding South Africa, and parts of Asia, such as India, Indonesia and Pakistan), and the other half of the world is probably overleveraged (mostly developed markets and some of the larger Asian markets, where debt levels are still unwinding from the peaks of the late 1990s). In light of the prevailing credit crunch, it seems inevitable that credit/GDP ratios are set to converge, both as lending is curtailed in the highly leveraged markets and financial intermediation continues to grow in the lowly geared emerging markets.

We specifically highlight two areas where credit levels could afford to be structurally higher: (1) mortgages: in Brazil and Russia, mortgage lending on 2007 data came to only 2% of GDP, in Turkey 4%, Czech Republic 10%, and Poland and Hungary both 12%; (2) microfinance: we believe there are opportunities in India and Indonesia to extend microfinancing.

Consensus forecasts put long-term growth in the aggregate emerging market banks universe at 12%. Looking beyond the current cyclical downturn, our analysts suggest the best long-term growth opportunities are in Brazil, Russia and India. In more detail, the themes that emerge from our analysis tend to surround the supply of microfinance, lending in the small and medium enterprise (SME) segment and a greater degree of consumer participation.

### 4. Technology

We need to remind the reader here of the inextricable link between the hardware and software aspects of technology. If software carries the purer notion of the intangible economy, it still cannot function without hardware. Hence, our analysis has focused on stocks from both areas, including also the telecom space.

More generally, the main thrust of our analysts' bullish argument on technology is that, from 2001 through 2007, technology suffered from a prolonged cyclical overhang of excess capacity built as a result of the Internet/Y-2K/dot.com bubbles. In addition, unlike other parts of the economy, technology was not well levered to the early phase of development in emerging markets, i.e. the tangible infrastructure investment needed to transform an essentially rural population into a more urban one.

From here, emerging economies complementing their tangible with intangible infrastructure investments should be a structural driver of growth for technology companies, as the services and consumer sectors become more substantial parts of economic activity within these regions. Our analysts also believe that in more developed nations, an understanding that ongoing investment in intangible infrastructure is also needed to continue to drive productivity and maintain global competitiveness adds further impetus for growth in the sector.

Securing the most recent technology allows emerging markets the ability to accelerate the "catch-up" process with developed countries. We believe the countries best set to exploit this are China, India, Korea, Malaysia and Russia.

Notwithstanding the nearer-term cyclical concerns to earnings, our bottom-up analysis reflects strong structural earnings forecasts for areas of our technology coverage universe. Specifically, we expect strong growth from companies with a high proportion of emerging market sales and those that rank among the lowest-cost producers. The product areas of particular interest include virtualization and other software platforms, internet portals, mobile penetration.

### 5. Business services

There is still a structural story of relevance in the developed world, but the current cyclical pressure on corporate spending is reflected in a clouded outlook for earnings. We also think the growth in business services in emerging markets will be superior to the equivalent in developed markets. For instance:

- In the outsourcing division, research consultancy Gartner expects worldwide spending on IT services to increase by a 7.4% CAGR over 2007–12. Within this, emerging countries are

expected to grow most quickly, by a 10%–16% CAGR over 2007–12 versus 5%–7% for developed markets.

- The global money transfer industry market was worth over USD 320 billion in sales in 2007, but we expect it to top USD 500 billion within the next five years, delivering a CAGR of around 9%. Revenue growth is expected to be strongest from China, India and Latin America.

However, isolating the emerging market growth potential is more difficult in this sector than in any of the others, given the global nature of many of the main corporate players. It is hard to find pure-plays.

Hence, key money transfer and consulting services companies have significantly diversified their geographical base and compete for business very effectively in the emerging market arena, as well as in developed markets. Ultimately, in view of the poor global growth outlook, this implies less scope to capture strong earnings growth in individual stock names. That said, we still find several companies that are expected to deliver above-average earnings growth over the next couple of years. Specifically, we consider stocks that operate in the outsourcing industry, the money transfer industry and which provide services that facilitate world trade (such as logistics, certification and legal advice).

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