

Fortnightly Thoughts

October 20, 2011

Issue 19

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Is global trade set to fade?

From the editor: We criss-cross the globe to answer this question, concluding that world trade and globalisation are here to stay as the world becomes increasingly intertwined. Risks are increasing though, both systemic and political, as austerity bites in the west. We interview Ian Goldin, Professor of Globalisation at Oxford University & Reinhard Lange, CEO of Kuehne + Nagel, and our tech, transport and commodities analysts dig into the world's supply chains.

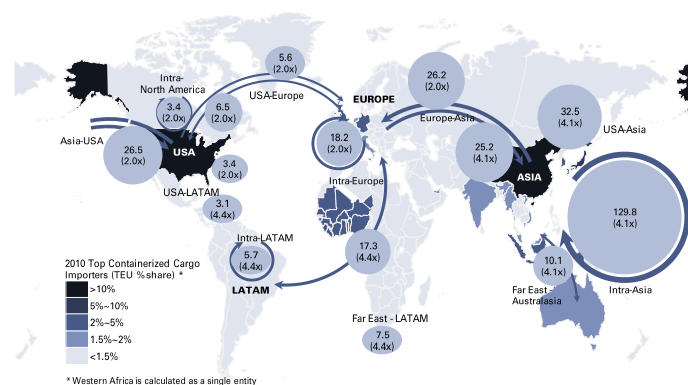
You can argue that there have been two golden eras of global trade; the 1871-1914 period and the period from the early 1980s to the present day. Today, the world has never been so large in terms of population, yet so small in terms of communication speed. Our lead article asks, has global trade peaked and is it set to reverse? At risk of ruining the surprise, we conclude that there are so many layers of interwoven complexity propping up globalisation and inter connectedness, and so many mutual benefits, that it is hard to see it being unwound.

But we do think it will be tested, sorely at times, over the next few years – the politics of slow economic growth may see some politicians advocate protectionist policies, ones that history implies cause economic damage. A bigger threat also looms: has globalisation ushered in a labyrinthine web of connectedness, creating disproportionate systemic risks that are neither fully understood nor easily controlled when tested? These issues are explored in our interviews with Professor Ian Goldin of Oxford University and also Reinhard Lange, CEO of Kuehne & Nagel.

We also look at the big new trade lanes (intra-Asian trade flows could be 9x bigger than US-Europe by 2030) and how the changing face of global trade is merely a reflection of a changing world. Our tech team outlines the key role of software in managing the increasingly complex supply chains that make key industries work. Jeff Currie discusses changing commodity flows, pointing out how the US has become less reliant on energy imports. We also show the supply chains for Apple and a Boeing 787 highlighting the global nature of manufacturing.

How the new world will flow

Containerised trade flows between regions of the world



Source: Drewry Research Market Summary, World Shipping council, Sea Asia 2011 conference, US MARAD, Goldman Sachs Research.

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Is global trade set to fade?

Before we look at what's next for global trade, we want to determine what the quantum and quantities of flows around the world are. In 2009, US\$8.3 tn of industrial goods were exported globally, and US\$2.3 tn of commodities were traded, whereas services exports accounted for US\$3.3 tn and private capital for US\$412 bn. Capital flows, for example, have dramatically increased as currency mechanisms have loosened post the Nixon Shock of 1971, leaving their gold anchors and increasingly their pegs to one another behind.

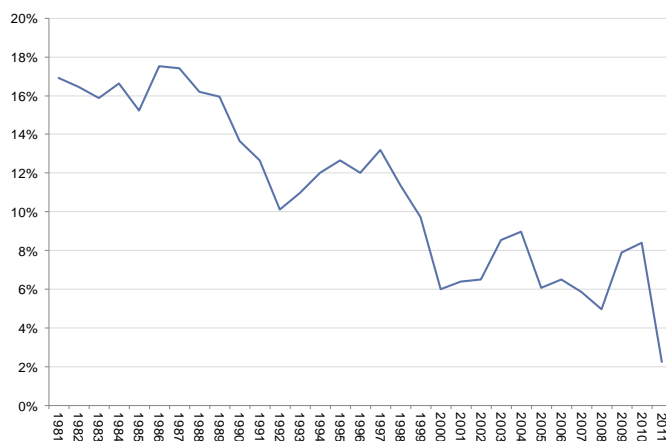
This liberalisation of capital (and increased tolerance of trade deficits) meant that it was able to flow around the world with impunity, chasing higher returns and levelling out differences in asset valuations. All of this meant that global trade became easier to fund, and consequently, trade barriers fell hand-in-hand with lower tariffs.

If capital has been a crucial stimulant and lubricant of global trade, then the western consumer has been equally important. The advent of containerisation (yet another innovation by the military, proving that adversity really is the mother of all invention!) meant that goods could be manufactured vast distances away from the point of consumption. This meant that the world could start using its resources (including labour) much more efficiently.

Containerised trade increased from 13.5 mn TEUs in 1980 to 68.7 mn in 2000, and to 138.9 mn in 2010. This was a very welcome disinflationary shock to the west, and spurred the prolonged consumer boom that was heralded by the slaying of inflation in the early 1980s (and arguably prolonged by the global savings glut of the 2000s which kept real interest rates very low – another example of globalisation at work). Taking 1980 as our starting point, the major trade lanes were US-Europe, US-Asia and Europe-Asia, basically circling the Northern hemisphere, with intra-Asian trade being very small. Roll forward thirty years and the major trade lanes have changed, with intra-Asia now the biggest trade lane, bigger than the Trans-Pacific trade. Some new lanes have sprung up too; for example Asia's container trade with Africa, Latin America and Australia is expected to grow at rates well in excess of the world average (over 8% pa since 2008). This means, among other things, that supply chains will need to be reshaped, and that the average distance travelled by goods will fall.

The decline of inventory

Euro Stoxx 600 working capital vs. net sales



Source: Datastream.

The genuinely global supply chain

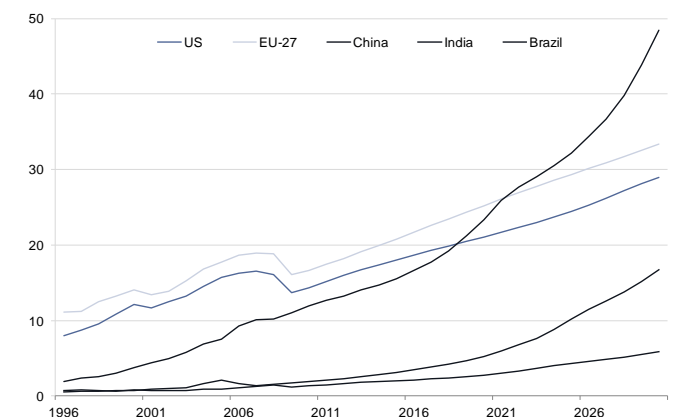
Falling trade barriers and technological advances have led to global supply chains being the norm. Just-in-time manufacturing, and global sourcing of components, raw materials and technology mean that whole regions can become factories without borders. Intra-Asian trade works in this way, with places such as Japan playing a crucial intermediate role in supply chains. Inventories are now very low versus history, meaning that capital has been removed from businesses, and manufacturing costs have been minimised, all of which contributed to the disinflationary 1990s.

However, inventories relative to sales probably can't fall much further from here; can Nokia really shrink the 8 minutes on average that components spend in its own supply chain? The real cost of shipping has steadily fallen over the past thirty years as transport companies, especially shipping ones, have kept the market oversupplied, often for strategic reasons (mostly in Asia). This also happened in the previous big surge in global trade growth in the 19th century when shipping costs fell by over a quarter.

Transportation costs have also fallen relative to the value of the cargo being carried, though in the last couple of years this has reversed a bit with the rising oil price. If oil prices increased meaningfully again and no offsetting technology was developed, then this could act as a brake.

China becoming an import story

Imported TEU (Twenty foot equivalent unit, millions)



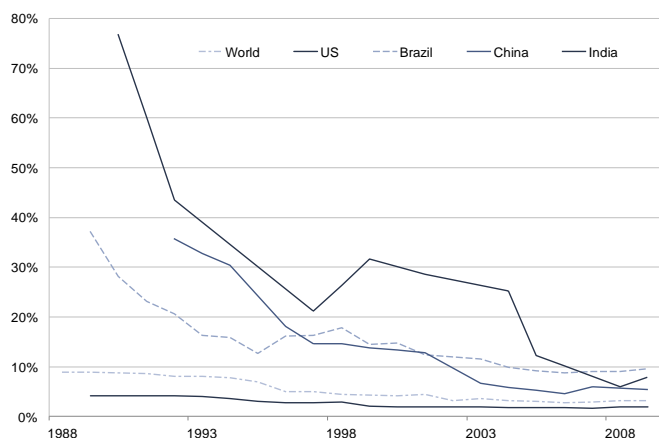
Source: Goldman Sachs Research estimates, IMF, U.S. National Statistics, BEA, OECD, MDS Transmodal.

If transportation costs aren't a likely brake, then what could reverse the globalisation of trade? Based on two recent traumatic events it could be credit or physical disruption. When credit evaporated in 2008, global trade saw some of the biggest falls ever seen. When letters of credit became unacceptable to the world's traders and merchants, the trade system shut down on itself.

A super-efficient supply chain can result in very narrow points where concentration risk is very high, such that when a natural disaster happens, an entire supply chain is knocked out. The after shocks of the Tohoku Japan earthquake were felt in multiple industries around the world (this has also been true with the recent floods in Thailand). Because supply chains have become so complex, more often than not the supplier of a component doesn't know who the person two nodes away is, who in turn doesn't know who the person two nodes away from them is. This adds a lot of systemic risk and it may be that the world decides after one too many shocks that it wants to simplify.

Falling trade barriers

Weighted average tariff on trade products



Source: World Bank WDI.

This then provokes a broader question, 'are we entering an era when the concept of globalisation will be tested in a way it hasn't been for 30 years'? Will the austerity years result in shifts in political outlook and rhetoric that seek to impose blame for current circumstances on globalisation? Globalisation has meant that in lower value-added industries jobs have been relocated or outsourced to where costs are much lower. Labour has seen its share of revenues fall, relative to profits, with corporate profits at long-run high levels of GDP in the west. This, combined with real increases in commodity prices, is putting pressure on disposable incomes, in stark contrast to the 1980-2007 golden age.

The system threatens the system

If you layer onto this systemic shocks such as food shortages or the credit crunch, then support in the west for globalisation may suffer. This is what happened after the 1929 crash, when protectionism rose sharply around the world as governments sought to protect their domestic industries. On this basis, Messers Smoot and Hawley are labelled the midwives of the depression, as their eponymous, tariff-raising legislation become the most famous of a period when the world went backwards. Another crisis could convince politicians that a reversal of globalisation would be preferable, if it reduced potential for crises, even if it meant lower growth. This is probably the biggest threat to global trade growth.

However, the world of today is different from then. Its honeycomb complexity would have even the most industrious bee colony saluting in awe. Unwinding the massive cross-border investment that companies and governments have made is difficult, and as the CEO of Kuhne & Nagel says in our interview on page 6, when 95% of US footwear is imported, how do you substitute that?

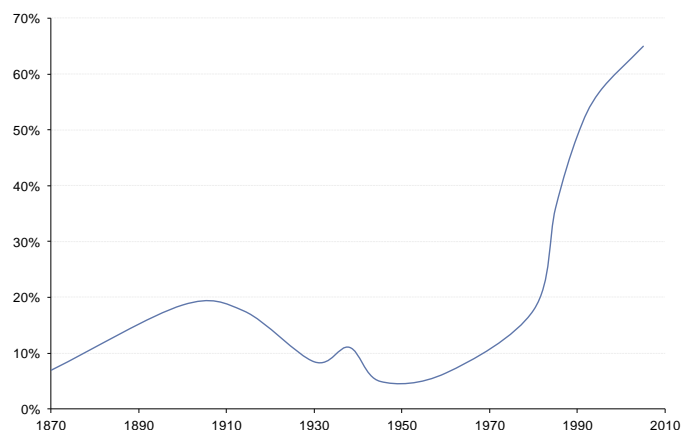
A world retreat into rigid silos and trading blocks would be difficult but not impossible. We note the proliferation of bi-lateral trade treaties in recent years, which indicates a move away from global, multi-lateral treaties. But set against this is the recent signing of one the biggest ever trade treaties by the US and South Korea, Colombia and Panama. Aside from the substantial overseas investments and revenues at stake for the corporate sector, it

would be an inefficient use of the world's resources at a time when resources are constrained rather than bountiful. And if the west were to become more protectionist and disengage from a connected world it would need to be mindful of where it is betting on its medium-term economic growth coming from (i.e. exports). Roll forward the world to 2030, and the west will need to substantially raise its export levels to offset glacial domestic demand.

If mercantilism ends in Asia and currencies float freely then this and labour costs may shift industry cost curves in the west's favour, so some manufacturing might relocate. But it is likely that China, for example, would invest heavily in automation and also cede some activities to lower-cost, reasonably proximate geographies (e.g. Vietnam). But you can see how countries like Mexico may see their relative unit cost position improve. Much has been made of some manufacturing returning to the US, but so far we'd describe it as more of a trickle than a flood.

Mutual benefits

Global stock of foreign assets as a percentage of global GDP



Source: IMF, Goldman Sachs Research.

So as we said at the start, our base case is that the world remains deeply connected, with multi-location manufacturing, and goods and capital unimpeded in their flows around the world. But we see challenges and tests as the imbalances in the world persist and the west copes with balance sheet consolidation. How to position for this? We believe that there are parts of the transport supply chain that have strategic value (e.g. ports), so we highlight AP Moller-Maersk. We also believe that the software companies making supply chain management possible are valuable – Dassault and Aveva are our preferred stocks. Rather than the asset owners, we prefer the managers and enablers of flows, i.e. we structurally prefer freight forwarders to asset providers like airlines.

Hugo Scott-Gall

Editor

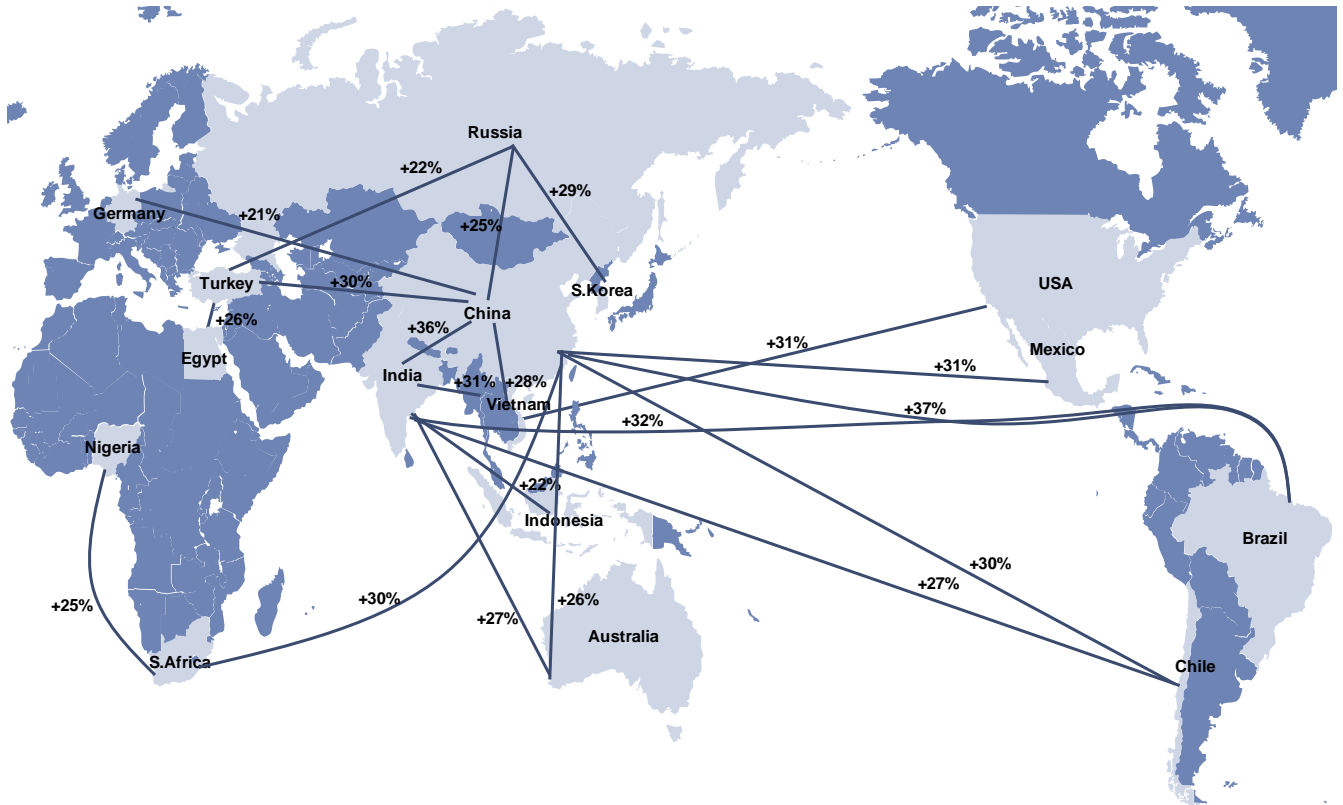
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Two charts of global interest

A selection of the world's 20 fastest-growing trade lanes

>US\$2 bn annually (2010), based on 2000-2010 CAGR of imports and exports in current US dollars (includes re-exports)



Source: United Nations Commodity Trade Statistics Database.

The world in motion

Selected system suppliers on the Boeing 787 Dreamliner

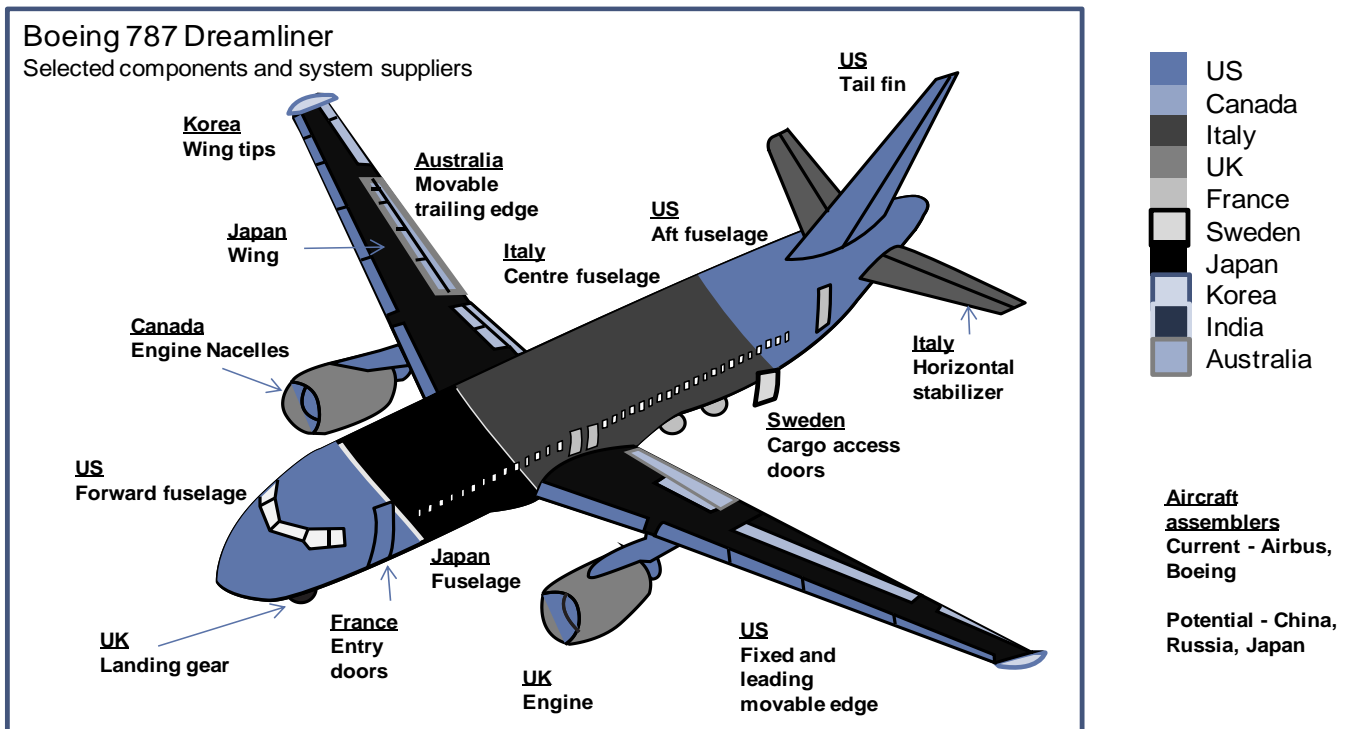
France, US
Inside seating, safety

Japan, France
In-flight entertainment

France, US
Inside cockpit, avionics

France, US
Internal electrical power

UK, France, US
Electric controls and components

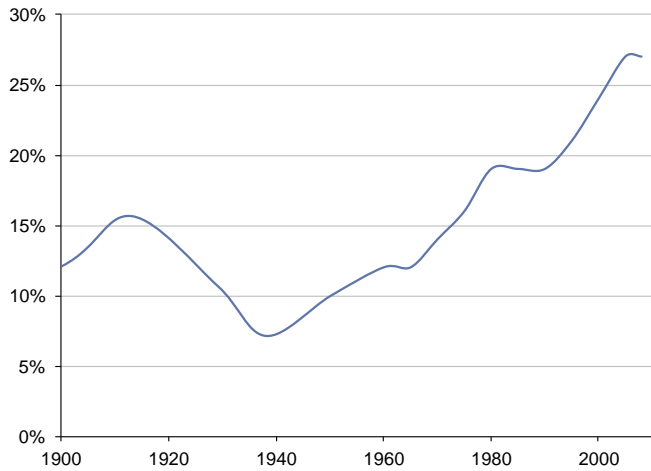


Source: Company data (Boeing), Goldman Sachs Research.

Six charts on global trade

The world opens up

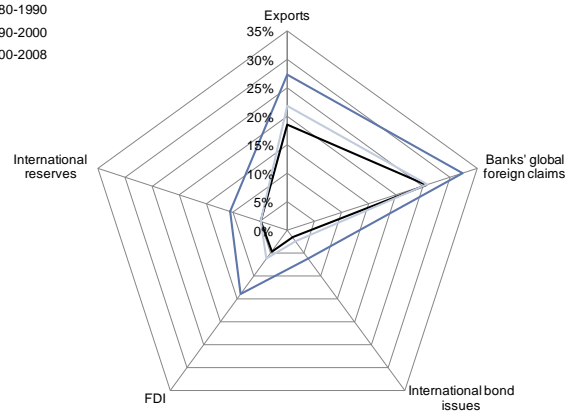
Global exports as a percentage of global GDP



Source: World Bank, IMF, Goldman Sachs Research.

The web expands

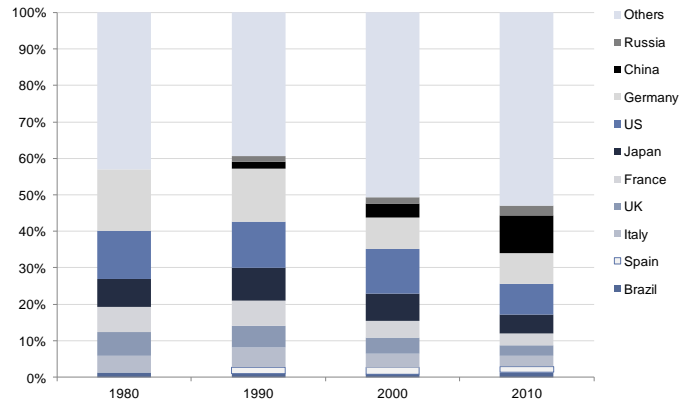
Cross border economic transactions as a % of global GDP



Source: World Bank, BIS, IMF IFS.

What a difference 30 years makes

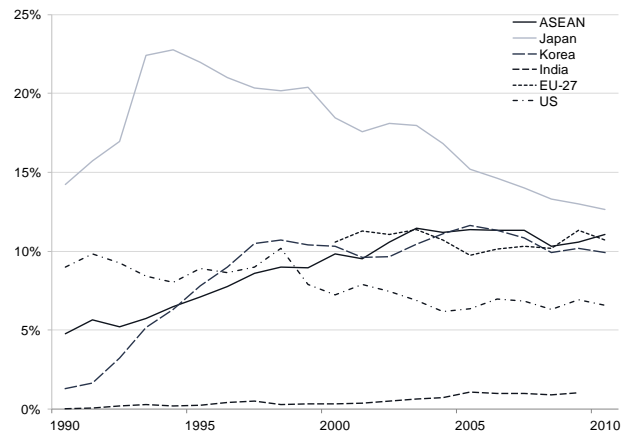
Market share of global exports



Source: UN comtrade.

Where China gets its imports from

China's Imports: per country and as a percentage of market share



Source: China National Bureau of Statistics, UN comtrade.

Some signs of insourcing

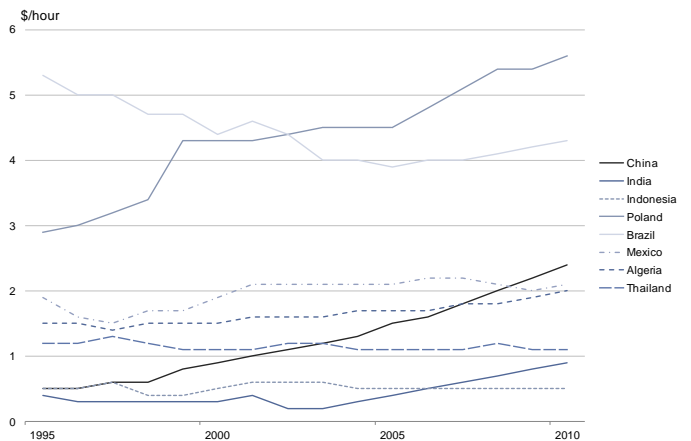
US manufacturing outsourcing trend



Source: US BEA.

Wages rise in the east especially China

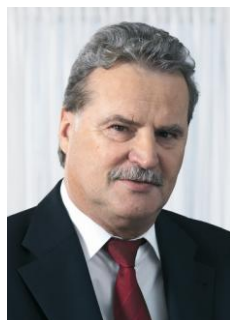
Manufacturing labour cost



Source: US BEA.

Interview with...Reinhard Lange

Reinhard Lange has been CEO and Chairman of the Management Board of Kuehne + Nagel since January 2009. He started his international career with Kuehne + Nagel in Bremen in 1971 following his apprenticeship as a freight forwarder. In 1985, he accepted a new challenge in Hong Kong, where for six years he successfully developed the seafreight business in the Asia-Pacific region as a member of the regional management team.



Hugo Scott-Gall: How has global trade evolved since the birth of containerization in the 1950s?

Reinhard Lange: It started with Sea-Land in the 1950s, the birth of containerisation, between the USA and Europe. It very quickly developed and affected global trade, with Asia Pacific becoming a major region, forming the trading triad; meaning Asia Pacific, the Americas and Europe. Asia was the major beneficiary of

containerisation, as it could escalate its low-cost manufacturing.

The mix of goods also changed. While traditionally, investment goods moved between Europe and America, with some consumer goods moving from the US to Europe, that is not the case anymore. So containers were the major escalator of global trade and it changed the mix of goods traded.

Now, South America, the Middle East, and a big part of Africa are also involved in global containerisation. In terms of value, initially very low-end goods were shipped from Asia, but now we see high-end products, such as computers and pharma, which were flying earlier.

The key drivers...compared to a bulk vessel, containers allow for much faster loading and discharge of goods. Ships spend less time in ports. Smaller shipments for consumer goods mean less pilferage and damage.

Hugo Scott-Gall: Which are the trade lanes of tomorrow?

Reinhard Lange: Over the last couple of years, the intra-Asia lane has become the biggest container trade in the world, beating Asia-Europe and Asia-North America. The key drivers? A lot of European or US exporters are now serving their Asian clients not from their domestic hubs, but using a direct shipping concept. For example, a well known sports fashion company could ship directly to its customers in Japan, with goods manufactured in Shenzhen, China, which doesn't hit Europe or the US.

Even in Europe, we see an increasing number of short sea services, which are competing with hinterland transportation. In LatAm, trade between countries in South America and Central America, and the US is growing. These are relatively new.

Hugo Scott-Gall: So distances are getting shorter...

Reinhard Lange: Yes. And we will see shorter average distances from here on.

The other important issue is the growth in inventory management. It really started in the mid 1980s, when customers outsourced their supply chain management, giving inventory management more and more to logistics companies. The 2009 crisis fuelled this further. This has of course reduced finance costs, which is what inventory management is all about. And for this, logistics companies have developed very high-end value-added IT systems. Already they control up to 95% of global air freight. To give you an example, in the early 1980s, forwarders or logistics companies controlled only

10% of container shipping, but with these tools, with these capabilities they have increased that today to 40%. So 60% is still with the shipping line itself, but the trend is very clear. While it may not reach 95%, like air freight, big steamship line companies can foresee a situation in which logistics companies could control more than 50% of the market in the years to come.

“ Over the last couple of years, the intra-Asia lane has become the biggest container trade in the world, beating Asia Europe and Asia-North America.

Hugo Scott-Gall: Are your clients re-in-sourcing their third-party logistics post the 2009 crisis?

Reinhard Lange: No, there is no trend of customers in-sourcing again. It happened during the crisis in 2008-09, when they had empty warehouses for other reasons. But outsourcing will continue. Not just in contract logistics, but also highly sophisticated inventory management systems, which will be the major driver for growth in logistics companies.

Hugo Scott-Gall: Are the new lean supply chains more vulnerable?

Reinhard Lange: Inventory management is very important. Very often, companies have too much inventory, but orders can't be cancelled without additional costs etc. But logistics management has become highly sophisticated. We follow up with shippers, have alternative shipping modes, alert systems etc.

Hugo Scott-Gall: And as the supply chain gets more complex in emerging markets, they would need third-party logistics too?

Reinhard Lange: That's 100% correct. In South America, for instance, logistics is controlled by the multinational customers who would have their hubs locally to deliver within LatAm. This is the clear trend. China is a little bit different, because freight is paid for mostly by the customers, who hence control the supply chain.

Hugo Scott-Gall: Given the current market volatility and fears of a double-dip, what is your view of the world?

Reinhard Lange: We cannot compare today's situation with the crisis in 2008, 2009. Today's environment is tougher, because it still has so many uncertainties. There will be an impact on the real economy. We are feeling this already, it started in May, June. It started in air freight, which is always an early indicator, because global air freight is almost 50% an unwanted business. And since May, global air freight has seen negative growth.

Whether we'll have just a further softening of growth, or a big recession, is difficult to forecast I think. At least, at Kuehne & Nagel we are ready for any kind of development, able to cope with the changes. So we expect a difficult first half of 2012 and hope for an improvement in the second half.

The next phase of global transport flows

Our shipping analyst, Edouard Baldini, dissects the realignment of global trade and what it means for transport companies

Since the maiden voyage of the *SS Ideal-X* from Newark to Houston in 1956, which marked the birth of containerization, global trade has evolved significantly, from the trading of basic consumer goods between the US and Europe to the boom of the IT trade from China to the western world, fuelled by a drop in trade tariffs and the free float of most main currencies. For the past couple of years, the menu du jour has rather focused on global trade realignment, with the birth of new trade lanes, mostly South-South and intra-regional. Who would have imagined 20 years ago that Intra-Asia trade would become the world's largest, 1.5x busier than Asia-Europe or Asia-US? And who would imagine today that China could import more TEUs than the US by 2019? Some obstacles remain however, with the spectre of protectionism rising again, albeit moderately, and a significant lack of transportation infrastructure in some of the key growth markets.

The four ages of global trade

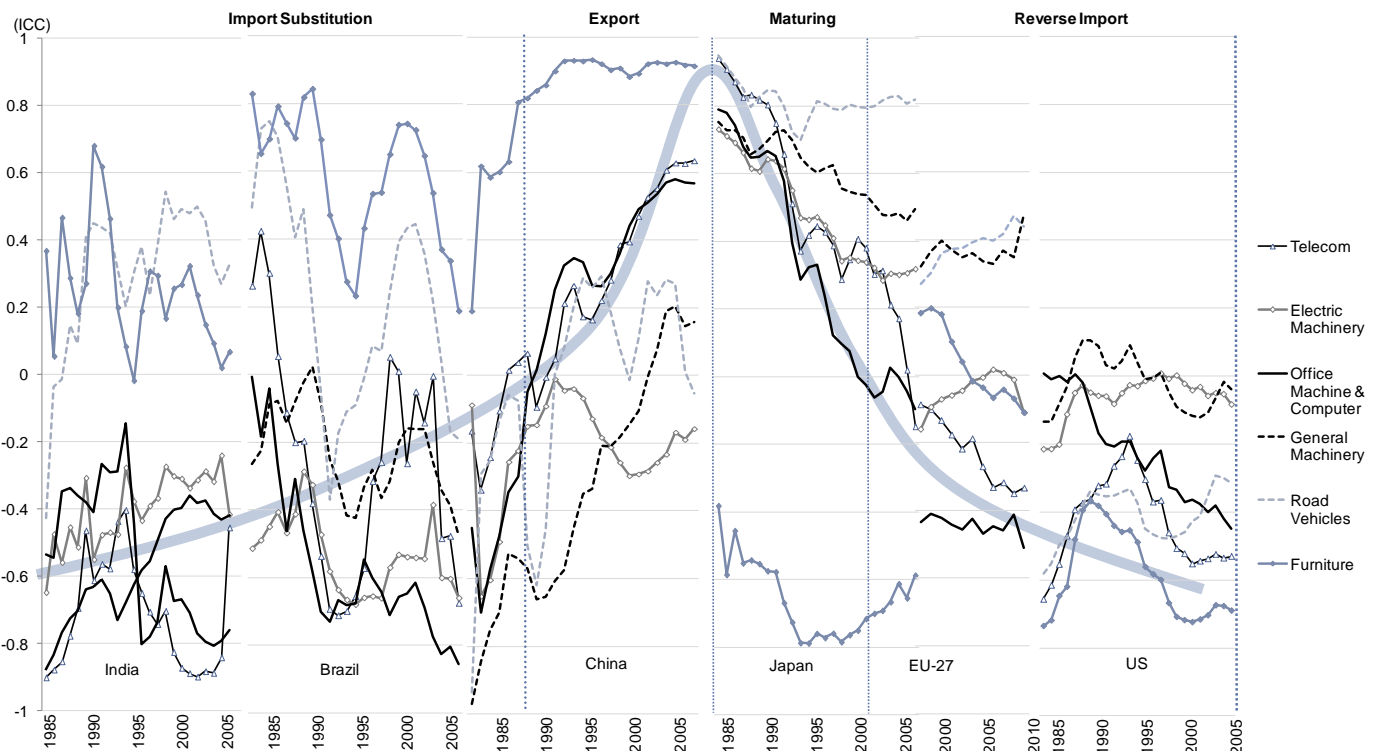
Global trade evolution is best analysed through the prism of "product life cycle" theory: four stages which help better understand how global trade has evolved, where the big flows are and where the new flows are (and will be).

(1) In the first phase, the product, or the country, goes through an import substitution period in which competitiveness is rising, but the country is using imports for substitutes (it has still not reached the point of benefitting from economies of scale through mass production; ICC between -1 and 0). Economies typically go through this phase as they emerge, as with India and Brazil currently. This explains the strong growth in the Asia-Latam; Mexico-Latam and Asia-India trades that we are currently witnessing. This trend is not to be underestimated - for instance Asia-Latam is now equivalent to 13% of Asia-Europe trade, and is growing double-digit.

(2) In the second phase, the country goes through an export period, where competitiveness rises with productivity, economies of scale appear and exports increase, (ICC of 0 to +1). Western Europe in the late 19th century and then the US in the early 20th century typically went through this "mass production" phase, resulting in a trade boom between the two regions (mainly consumer products). Japan won its status as "number one" in the post-oil crisis world, thanks to a different manufacturing model in which each product has its unique parts. This was very relevant to the transportation industry (e.g. Toyota). This dominance faded in the 1990s with the IT revolution and the emergence of Korea and ultimately China, with a move back to US-style, more modular manufacturing (i.e. different parts can be used on different products). This shift of competitiveness from West to East, and within the East, explains the boom of the Asia-Europe and Asia-US trade lanes of the past 40 years, and the emergence of the Intra-Asia trade later in the 1990s/2000s, (see below).

From burgeon to wither the four stages of global trade

The international competitive coefficient (ICC) of certain products in India/Brazil/Japan/China/EU/US (1995-2010) - this measures the competitiveness of a traded good (calculated as exports-imports/exports+imports)



Source: UN Comtrade, Goldman Sachs Research.

(3) In the third phase, a country matures, its export competitiveness is maintained but its relative advantage declines as other countries catch up and produce at a lower cost, (ICC falls to a 1-0 range).

Competitiveness is maintained by specializing in higher value added products. In a way, Germany and Japan are still in this phase as they tend to specialize in products such as machine tools or transportation and specialized machinery.

(4) Finally, in the last phase, called “reverse import”, the country loses competitiveness to low-cost imports from other countries. This is particularly the case for the US today.

At a turning point: global trade realignment

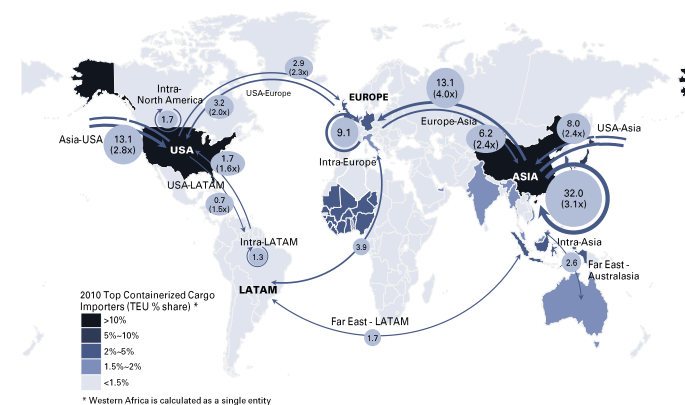
Analysing global trade from an international competitiveness angle (refined to certain key products) helps understand how global realignment is, and should continue to be, a key feature of international trade going forward:

(1) **China should remain a significant exporter of manufactured goods in the near future:** Although its ICC has been steadily growing over the past decade, it remains below 1 for most products, indicating high competitiveness. As its economy, and its labour costs, keeps growing, it will have (and already has in certain areas) to specialize in more value-added products, and enter its maturing phase. Interestingly, and as an illustration of this point, the dollar value of a kilo exported from China has gone from US\$0.5 in 1997 to more than US\$2.6 today.

(2) **But should also become the world's largest importer...** For certain products however, China is already close to reaching its maturing phase (e.g. furniture, telecom, IT) and is being challenged by India and South East Asia. Consequently, and similar to what happened with Europe, the US and Japan, China should progressively move from its current role as an export machine to a significant importer of goods, underpinned by the growth of its middle class. We calculate that China currently imports the same number of TEU per household as the United States did in 1975, growing at a CAGR of 14% since 1996. If this ratio grows at a similar rate to that of the US historically, then it will import more TEUs than the US by 2019, and more than the EU by 2022, (see below), significantly boosting global trade.

Intra-Asia is already the world's busiest trade lane

2010 (MN TEUs) vs. 1997 (2010/1997x)



Source: *Drewry Research Market Summary, World Shipping council, Sea Asia 2011 conference, US MARAD, Goldman Sachs Research.*

(3) **...which it will source from India, South East Asia and the Western world** (including Indonesia) and Latam, which are still in their import-substitution phases. As their competitiveness is rising, they should shift the balance of trade with China and the western world to become net exporters, starting with low value-added goods and then moving along the value chain. Western economies should also benefit, as a growing number of Chinese consumer can afford higher-value goods. As such, we expect Europe-Asia to grow much faster than Asia-Europe.

(4) **Regional trades should grow faster than global trade:** As we go through this shift, South-South trades should grow faster than global trade, buoyed by further bilateral free trade agreements within and between trade blocs. As shown on the map, Intra-Asia is already the largest trade lane in the world (TEUs carried, not distance adjusted). We expect Intra-Asia, Asia-Latam and Asia-Africa to particularly benefit from this trend.

Who will benefit among the supply chain movers?

Third-party logistics providers should keep growing at a multiple of GDP: As global trade developed and supply chains became more complex in the West (e.g. IT), third-party logistics providers emerged: in 1980, only 10% of the world shipments were handled by freight forwarding companies, we are now closer to 40%. As companies in emerging economies go through the same process of internationalisation, they will need more than just port-to-port or terminal-to-terminal transportation, and should therefore outsource more of their logistics.

Transportation infrastructure a key challenge but also an area for growth: A key challenge to the global trade realignment thesis is the lack of infrastructure in some key emerging economies. According to the World Economic Forum's global competitiveness report, India ranked in the mid 80s (of 142 countries) on the quality of its ports and road infrastructure. Indonesia and Vietnam's port assets respectively were 103 and 110. As governments invest more to bridge that gap, they will need the expertise of foreign private companies, sharing the growth with the best positioned operators (e.g. DP World, Hutchinson, APM Terminal). Given the strategic value of these assets, JVs are more likely we think.

Shrinking distances between consuming and producing areas will negatively impact demand: As South-South and intra regional trades enjoy above-market growth, overall distances will shrink. For instance, it takes five days to travel from Shenzhen to Jakarta, compared to 28/30 days to northern Europe.

Can the world de-globalise?

The recent vote of the Currency Exchange Rate Oversight Reform Act by the US Senate, which would allow any “fundamentally misaligned” currency to be subject to duty taxes, has renewed fears of post-1929-style protectionism. It is true that globalisation has been made possible by a significant decline in trade tariffs over the past forty years, and the free float of main currencies. And there is evidence that tariffs are rising for the first time since 1998 (from 1.7% in 2008 to 2% in 2010 in the US).

However these remain extremely low in absolute terms and in the context of history. And as the US is at a completely different stage of its “product life cycle” than China, repatriation of manufacturing activities would imply a fundamental industrial shift, with a significant impact on the consumer, as China's manufacturing costs are still just 14% of the US's. Rather, the US would source the same products from different low-cost regions. Mexico is often mentioned as a key beneficiary, and there has been some headline grabbing evidence of the US switching trade away from China to Central America. However, this evolution is marginal: for most of the 13 key products we analysed, China is still gaining significant share in the US market vs. Mexico, with the notable exception of vehicles and entertainment goods.

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Interview with....Dr. Ian Goldin

Dr. Ian Goldin was the VP of the World Bank (2003-06) and prior to that the bank's Director of Development Policy. He is a Professor of Globalisation and Development at Oxford University, holds a Professorial Fellowship at Balliol College, Oxford, and now serves as the first Director of the Oxford Martin School (www.oxfordmartin.ox.ac.uk); founded in 2005 to facilitate and innovative inter-disciplinary research on the problems, dangers and opportunities of the near future.



Hugo Scott-Gall: Does the world become more connected from here?

Ian Goldin: We're more connected than ever in history, and there's been a leap in the level of connectivity over the last 20 or so years. We've seen the fall of the Berlin Wall, the opening up of about 64 countries, from dictatorships to more open, more democratic economies, the implementation of a succession of trade rounds, which has pushed trade tariffs to well under a third of

the level they were in the 60s and 70s, and the period subsequent to the 1990s. And, we've seen the effectiveness of capital account liberalisation through various reforms that the World Bank, IMF and others have engaged in.

On any metric you look at, be it flows of goods, services, telecommunications traffic, internet traffic obviously, you see this very, very steep incline in connectivity around the world. And not only in terms of the breadth of the different forms of connectivity, physical, virtual, but also the types, the ranges – not only bankers or the manufacturers of goods and services that are connected, but everyone. It's the hip-hop dancers in Harlem connected with hip-hop dancers in Shanghai. What's driving this? Things like containerisation and fibre optics have been incredibly powerful changes. Growth in incomes as a key driver, not least the rise of the emerging market middle class. We're seeing a convergence of aspirations across the world. All this makes me optimistic that we'll get more, not less connected from here, and see an unleashing of collective brain power that can be applied to global problem solving.

Hugo Scott-Gall: But globalisation isn't working for everyone?

Ian Goldin: There's an underbelly of people who are disconnected, because they're geographically isolated or lack physical infrastructure. But most often it's because their governments have disconnected them, by banning internet or not allowing connectivity, or because only a very small number of people in that country benefit, like, say in Angola. The big challenge is ensuring this globalisation process is inclusive, and that more people benefit. Most people have benefited, but there's the bottom billion who are basically left out.

Hugo Scott-Gall: What about the systemic risks of connectivity?

Ian Goldin: First, it's important to stress that globalisation has been the most progressive force in the history of humanity, in terms of its ability to transform for the better people's lives around the world. But the other side of this integration is interdependency, and the very high level of systemic risk that has developed because of the increase in complexity and extent of connectivity. We have seen in the financial crisis the first very clear evidence of systemic risk, and how it's going to propagate in many other ways in the future. Lehman Brothers was a node with a lot of traffic going through it, but that wasn't fully understood, and that's very characteristic of the problem. When, for whatever reason, that node becomes overwhelmed you get contagion, and risk that

cascades very rapidly, that gets amplified very rapidly and jumps previously secure risk frontiers. This is characteristic of systemic crises, they quickly and completely overwhelm the regulatory and management capacity to deal with them. The financial crisis is the first of the 21st century systemic crises, and certainly not the last.

Hugo Scott-Gall: So it's unavoidable, we become less stable?

Ian Goldin: When we're building these super-connected systems, a source of our future wealth and well being on the planet, we must be mindful of the Achilles heel of this, which is that we're also building a pathway for systemic risk. We're going to become increasingly unstable unless we understand the new levels of complexity and risk and build resilience. Politically, we face the danger that if people see globalisation and integration as bringing unwanted and severely destabilising shocks, politically they will choose a potentially slower, but more predictable, growth path. And what you get politically out of a response to this is xenophobia, nationalism, protectionism, increasing trade barriers, blaming others for your problems and a belief that somehow you can go it alone.

Failure to manage systemic risk could lead to de globalisation, and this would be absolutely disastrous in the short-term and the long-term, particularly for poor people who have not yet been able to benefit from globalisation, but more broadly for everyone. Even the middle classes may feel that there is more downside than upside for them from globalisation and so may push against it. So, we need to make the system much more robust, we need to become more mindful of the systemic risks.

Hugo Scott-Gall: It's not just financial crises that worry you?

Ian Goldin: The thing I'm most worried about is pandemics. I believe that there will be another serious pandemic that could severely destabilise globalisation, and that could spill over into finance. I'm particularly worried about the rapidly evolving technology to develop man-made bio pathogens. I think this is a real threat, maybe not immediately, but certainly in the next 20 years, and what we do about it now is very, very important.

The reality of living in a global village is that the people that want to do the village harm have more powerful weapons now and that individual actors or small groups may be as threatening as nation states. I think about them as the new pirates - people who can strangle globalisation and destabilise it. In addition, we need to be concerned with climate change, and systemic risks associated with environmental and natural resource destruction, particularly damage to the atmosphere. This could lead to a reaction against growth and connectivity. Increasing weather instability, for example, could have serious, multi-layered consequences. Migration and the movement of people are absolutely intrinsic to connectivity. It is the most important part of this, and if people cannot move because of increasing xenophobia, protectionism and the view that connectivity brings more problems than benefits, globalisation will slow and the desire to keep out migrants will be among the first casualties. Societies that don't absorb people will become ossified and unable to compete in the future world.

Hugo Scott-Gall: Who polices the inter-connected global system?

Ian Goldin: Unlike a traditional village, where you can rely on the village elders to solve problems and so sleep well at night, what hasn't worked in the new age of globalisation is global leadership and global coordination of global problem solving. We are stuck with a 20th century, pre-1990s model created in a very different cold war world. This is a major problem since connectivity and integration has increased tenfold or more, depending on the flow one is measuring, while institutional evolution has maybe increased by a tiny fraction – the growing disconnect between connectivity and integrated global problem solving is the biggest challenge.

China's role is very interesting; it has changed its level of connectivity most rapidly over this 20-year period. Will it become the global village elder? From my discussions with the Chinese there is a remarkable diffidence about being the global leader, it's the opposite of the US where they say, 'we are the global leader'. The Chinese say, 'we were the global leaders some 300 years ago, and we're coming back to what we used to be. But China still has over 300 million people living in severe poverty. We have to meet our own economic, political and other needs at home first, before we can provide leadership outside China'. In China, as is the case elsewhere, the domestic trumps the global challenges.

Hugo Scott-Gall: Do you think events like the Japanese earthquake, which highlighted the fragility of interconnectivity, can become catalysts for de-globalisation?

Ian Goldin: Not necessarily, but we can learn from them. A chip manufacturer in Japan had 97% of world's production in one of the affected places; that concentration should've never been allowed.

It used to be illegal in the US to have that sort of corporate hold on any one production, but de-regulation has allowed concentration of production and that's a major cause of the problem. One insurance is ensuring you're not dependent on any one source in one place for any one product that's key to your supply chains or your consumption chains. That's a vital lesson, and we should seriously consider legislation and regulatory means to avoid monopolisation of critically important products. Secondly, business and accounting practices have placed extraordinary emphasis on 'sweating assets'. Capital on balance sheets, stocks in warehouses and other 'wasted' assets. The incentives are all directed towards creating tighter supply chains and eliminating any spare capacity in the system. So when you get a shock at any point in the chain, it amplifies very quickly through the whole system and knocks out the whole supply chain. This doesn't only apply in the private sector, the just in time concept now applies to public service utilities as well, including the food in your kitchen, the oxygen bottles in your hospitals, energy in the grids. You name it.

Hugo Scott-Gall: Could that make the world less efficient in its resource use though, for example, if import substitution rises?

Ian Goldin: I'm a fierce believer in freer trade. I believe that is not only optimally efficient, but also the better way of insuring against instability; I think it's the most diversified strategy. The Central Limit Theorem informs my thinking. The more countries that participate in the market place, the more stable and diversified you are in terms of sources. The idea that when at home, you can somehow protect yourself by growing things is, I think, a Luddite concept. The US should not be growing cotton through subsidies which distort markets, and benefit well off farmers in the USA while ruining the employment and income opportunities of millions of poor farmers in Africa. Nor should the distortions of the European Union which have no economic rationale, are environmentally destructive, and which increase poverty in developing countries be condoned. There is a misuse of public

resources and it accentuates poverty and price instability. The distortions of markets to support biofuel production is similarly inappropriate, not least as it may be counterproductive in terms of its carbon and energy input, with a range of negative spill-overs.

Hugo Scott-Gall: Are you, like consensus, gloomy on demographics?

Ian Goldin: Well, I'm an optimist on demography in general, I think the problem of 2050 is going to be too few people, not too many, particularly young people in key places where they are wanted. If you assume entry and exit ages to the labour force are more or less the same as they are now, the rapid change in demographics implies a decline in the OECD workforce of from about 800 mn to 600 mn people over this period. Current levels of migration into the OECD are about 10 mn, so even if there was an increase of ten times the migration levels, which is difficult to imagine, it still wouldn't begin to compensate for the decline. Migration's important for many reasons, but it won't fully compensate for the dramatic decline in fertility rates in rich and developing countries.

I think we will abolish the concepts of retirement and pensions. Certainly, there are people who will work and think of their lifecycle in a different way – when the retirement system was developed about 7 years of pension were contemplated but now, life expectancy following retirement is approaching 30 years. If you're healthy, if you feel you can still contribute to society, and if your savings are depleting and you're only getting a 1% or 2% return on them, then you're going to have to keep on working for a very long time. It has all sorts of other implications – your kids will only inherit your house when they're 80.

Hugo Scott-Gall: And on life expectancy?

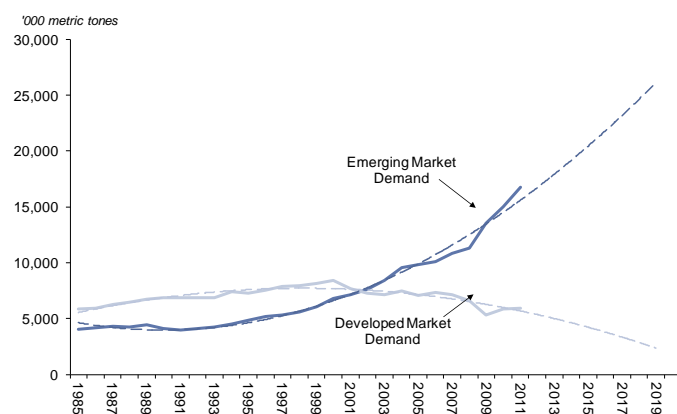
Ian Goldin: The big question here is on neuro-degeneration, as while there are major advances in physical regeneration and life extension, there is much slower progress on diseases of the brain, such as Parkinson's, Alzheimer's and dementia. One can see a transition period until we manage to meet many of the biggest challenges. I worry about the next 20, 30 years as they're potentially a perfect storm period, for food, water and energy, and also for neurological disease reasons. I think physical regenerative capacities are leaping ahead of our own neuro-regenerative capacities. And that's going to create an environment where we have rapidly increasing numbers of highly dependent old people. That's going to have all sorts of consequences; one is a lot of helpers at great cost. The second is a whole new debate about euthanasia and who pulls the plug, when and why. By the time we get to 2050, I believe we'll have conquered a lot of our neuro-degeneration problems and diseases. In that case, there'll be an environment where 110 year olds are mentally and physically, on average, healthy and working. By then we will have also have climbed the big mountain that we face in terms of the management of rapidly growing demand for energy and natural resources and population will have stabilised. If we have not managed our global commons we will be in a dark period. But we are witnessing an unlocking of potential, with billions of newly educated people connected and aware, which I believe has the potential to help us meet our enormous challenges. If we can navigate through the perfect storm which is coming we can look forward to decades of declining population and reducing pressures in a world which by 2050 could be free of poverty and many of the diseases which afflict us today. Recent decades have demonstrated the benefits of globalisation and closer connectivity. Our challenge now is to understand how to build on this momentum and to mitigate the challenges arising from our success, not least with respect to the new systemic risks.

The impacts of resource realignment

Jeff Currie, our Co-Head of European Economics, Commodities and Strategy Research and the Global Head of Commodities Research, maps the changing patterns of commodity flows around the world in response to burgeoning BRICs demand.

The high level of macro uncertainty that has engulfed markets recently has created significant concerns over the future of commodity demand in the US and Europe. This heightened concern overlooks a simple fact. Demand in these regions has been shrinking for many years now, as it must decline to make room for surging demand from the emerging markets. This is why, in the first half of 2008, oil prices surged to record levels despite the US and Europe already being in recession. These patterns have been seen across key commodity markets, but have been most profound in copper, where significant supply constraints have forced an unprecedented rationing of developed market consumption to make room for robust emerging market demand for infrastructure development.

EM have crowded out DM demand
Copper demand in 000 tonnes



Source: Brook Hunt, Goldman Sachs Global ECS Research.

We have long argued that the supply of key commodities such as crude oil and copper is inadequate for both developed and emerging market consumers to continue to consume at the same rate they had been doing. Accordingly, prices must rise to the point that causes consumers in the US and Europe to reduce demand sufficiently to accommodate the new and large appetite for commodities from the emerging markets. The key is that an emerging market consumer is willing to pay more for commodities than a developed market consumer, as the use in places such as China and India creates more economic value than it does in the US (which in many cases is simply commuting to the mall, or some other low-value activity). In other words, the marginal value of a barrel of oil consumed in China is far greater than the marginal value of the barrel of oil consumed in the US.

In 2009, we labelled this dynamic “resource realignment” – the need to reduce consumption of commodities in the developed markets to make room for robust economic growth in the emerging markets. To achieve this realignment prices need to rise to a level that creates demand “restraint” in the US, and other developed markets, generating an additional source of supply for emerging market consumers. The size of this realignment is substantial in many important commodity markets. For example, the US has 5% of the world’s population, but consumes roughly 25% of the world’s oil supplies, while China has 25% of the

world’s population but consumes only around 10% of the world’s oil supplies. It is these numbers that need to be realigned over the next decade.

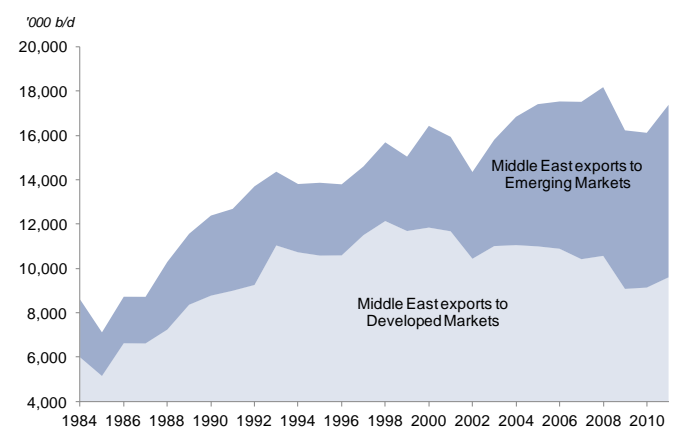
Clearly the primary effect of this dynamic is a sharp rise in commodity prices to levels that adequately reduce demand in the developed markets to free up commodity supplies, but there are significant secondary effects that we explore below, including slower economic growth in developed markets, a narrowing in developed market trade balances and lastly, and most importantly, significant investment in new technologies. And it is this last point that paradoxically suggests that commodity markets, the first and most globalized of all markets, are becoming more localized in the pursuit of becoming increasingly more self-sufficient, at least over the medium term.

Resource realignment is a supply shock to developed world

Outside a few temporary supply disruptions, such as in Iraq and Libya, the defining feature of the now decade-long rally in commodity prices is that it has been largely demand driven, and not due to a supply shock, as was observed in the 1970s. Instead of a sharp reduction in supply that dragged both demand and economic activity down, as occurred in the 1970s, in the current environment it was demand marching up a steep supply curve, or in some cases running headlong into supply constraints, that created the sharp rise in prices.

Middle East demand has capped exports while China gets an increasing share at the expense of the OECD

Middle East oil exports (000b/d)



Source: IEA, Goldman Sachs Global ECS Research.

While this demand driven interpretation is a global phenomena, it is less true locally, particularly for the developed markets where resource realignment has created a quasi supply shock that has and will continue to act as a drag on economic growth. We estimate that had we not seen the rise of emerging market demand for commodities in the 2000s, and had oil prices remained near US\$20/bbl, US economic growth would have been 25-50 basis points higher each year on average over the past decade.

This creates a trade-off between growth in China and growth in the US, and this was very apparent in 2009 when a deep recession in the US and the developed markets allowed China to grow

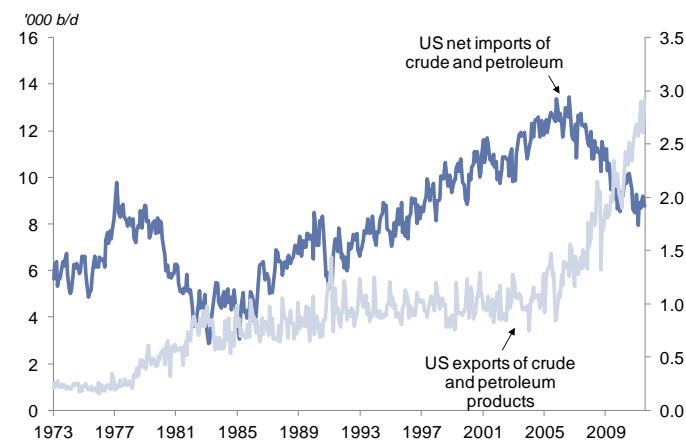
unimpeded, consuming unprecedented amounts of commodities. That year, China overtook the US as the largest buyer of Saudi Arabian oil, forever changing the trading patterns and the politics of oil. But equally important, not only was Chinese demand for oil rising rapidly, but so was Middle Eastern and Saudi Arabian demand for oil, such that exports from the region have been mostly flat since 2000, leaving less supply to be split between emerging and developed markets. Over the past decade, Saudi Arabian demand is up 70%, which alone has taken 1.1 million b/d of supply off global oil markets.

Resource realignment improves the US trade position

Not only has resource realignment created both a reduction in Middle East supplies and a redirection of supplies towards the east, but even the US has become a net exporter of oil products to Latin America, while Western Europe exports products to Eastern Europe and Africa, and even Japan exports products to China. As the developed markets import less and export more, this transition begins to have a significant impact on their current account positions, particularly for the US, where oil represented nearly 40% of the current account deficit in 2010.

US petroleum net imports have dropped by a third

US net imports and exports of crude & petroleum (000b/d)



Source: US Department of Energy (DOE).

The most recent data from the US suggests that since late 2006, net imports of oil and oil products into the US have declined by nearly a third. This impressive reduction in net imported oil was achieved through a combination of a significant reduction in demand, new and growing exports markets in Latin America and new domestic supply sources. Going forward, we expect that the US trade position will continue to improve as all three of these factors act to reduce US dependency on foreign oil.

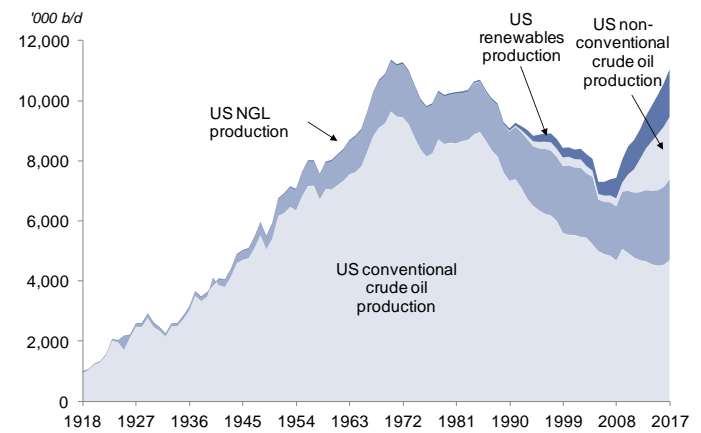
Resource realignment stimulates innovation

This significant shift in oil flows away from the developed markets and towards the emerging markets was not simply achieved by a reduction in demand in the US and Europe, it was also achieved through technological innovation and investment in alternative energy sources such as oil and gas shale, biofuels and other renewable energy sources. The resulting high prices that create resource realignment also put a premium on a country being self-sufficient in commodity production, which stimulates investment into alternative domestic supply sources. This do-it-yourself dynamic has been most impressive within US domestic energy, particularly in oil and gas.

Although this process began in 2006 with significant development of biofuel supply sources (which have a whole host of problems on their own that are beyond the scope of this piece), the shale gas revolution that took hold in 2008 is what significantly changed the current energy position of the US. It illustrates an import theme we have emphasized in the past – don't bet against an engineer, give them enough time and money and they will solve the problem. By 2010, these technologies were being applied to petroleum with the development of oil shale that has dramatically increased the ability for the US to grow oil supplies just as its demand is shrinking.

Technological innovation will push US supplies to new highs, backing out more supplies to go to China

US crude (conventional and non-conventional), NGL and renewables production (b/d)



Source: DOE, Goldman Sachs Global ECS Research.

Globalisation leading to temporary localisation, but globalisation will prevail

The irony of this is that commodity markets, the first truly globalised markets capable of efficient arbitrage to every corner of the planet, are now becoming more localised and in some cases entirely disconnecting from the rest of the world. This localisation is most dramatically captured by the US natural gas market, which has completely disconnected from the global gas market due to shale gas development. With US natural gas prices trading at a 65%-75% discount to global prices, the US now enjoys a substantial competitive advantage relative to the rest of the world that consumes much more costly natural gas.

However, this advantage will likely dissipate over the longer term, as infrastructure development will likely ultimately make the now local US supply available to the rest of the world at the same time that the threat of rising US shale natural gas and oil should motivate expansion of global supplies to the benefit of the world as producers strive to maintain market share. But in the meantime, resource realignment will likely continue to support commodity prices, which will give the engineers more time, and more money, to potentially create new revolutions that could further change global trading patterns.

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The software that enables trade

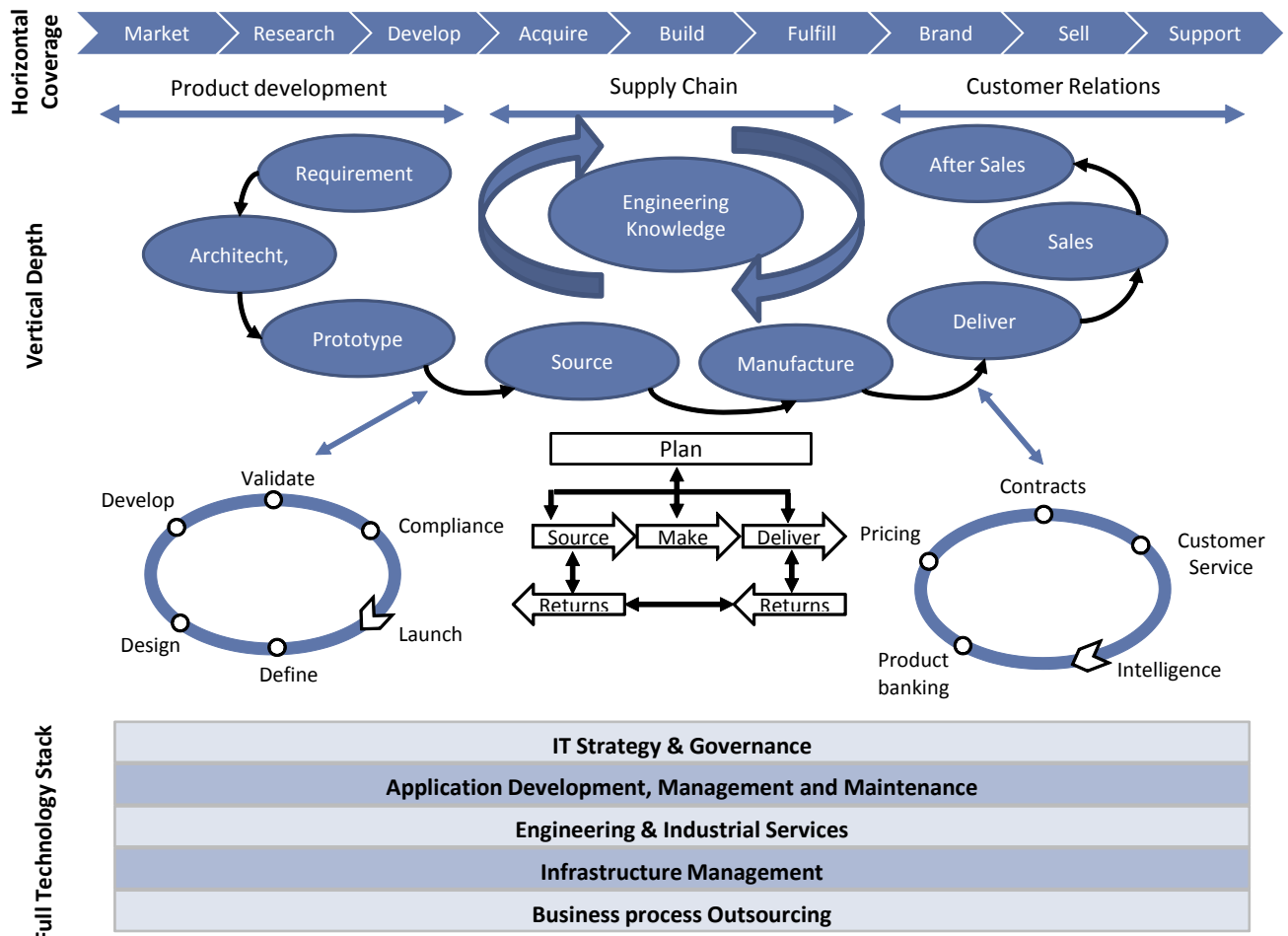
Mohammed Moawalla, our software analyst, explains the crucial role of collaboration software in making global supply chains work

The roots of the collaboration software industry can be traced to the development of the wider applications software market. Approximately 20-25 years ago, large companies began implementing systems of record, such as ERP applications or systems of design such as CAD applications, to automate core processes. Approximately 15 years ago, additional investments were made in supply chain software systems, to better plan and optimise. Though these systems significantly improved the overall efficiencies of large enterprises, they still existed in separate silos (in part due to products built on differing code bases), limiting their full benefits.

It was not until the advent of middleware, data management and analytics tools in the last decade that companies were able to harness the information in these disparate sources. Today these systems have evolved into full collaboration suites and platforms, and are seeing wider adoption particularly among industries with meaningful supply chains and connectivity.

In essence a collaboration system manages the flow of information of a product and process among all the various participants. The basic elements of a collaboration platform include data management (the ability to extract and interchange data from disparate sources), product visualisation (team collaboration, conferencing tools and digital prototyping) and managing the engineering changes of components, configuration of products, document management and planning project resources, timescale and risk.

Collaboration across the entire value chain for the high tech industry



Source: Goldman Sachs Research.

Technology changes (emergence of SOA and Cloud) facilitate even greater collaboration

Each technology cycle has facilitated an increased level of collaboration, and the shift to the internet has been a significant enabler. Phase 1 of the advent of the internet, the emergence of service oriented architectures (SOA) provided a common highway code on which applications for the internet are built – this process has enabled easier sharing of data between applications.

Phase 2, the evolution of the cloud infrastructure, has allowed the proliferation of new applications, access to multiple devices beyond the desktop, and we think greater consumerisation of IT. For example, Facebook, is probably the best example of a collaboration platform, fostered by the cloud.

We believe future enterprise applications and collaboration platforms will evolve to incorporate social media capabilities and mimic a lot of the features available on Facebook and Google+

such as video conferencing, in-platform application running, messaging - both one-to-one and group-based, location-based services accessible across multiple devices.

An emerging product category that is under-penetrated

We expect the collaboration software market to grow at a 10% CAGR over the next 2 years; to put this in context, it is among the top quartile of growth categories within the broader software universe. The key drivers around the adoption of collaboration systems include more global proliferation of supply chains in industry, moves towards just-in-time inventory and production, reduced time to market, improved product quality, savings by avoiding duplication of data, better integration of engineering workflow and documentation to aid compliance with regulatory requirements. Collaboration systems are increasingly becoming the nerve centre or critical hub linking the tightly and loosely-coupled supply chains driving many industries. Hence, they must be scalable - for example Boeing estimates that during the design phase of the Boeing 777 programme, 1.9 petabytes of data was shared and transferred on its network. Unlike back office or design systems, collaboration systems touch a much wider user base in an organisation, and industry estimates peg a 5:1 user ratio for every ERP/Design seat.

Industrials have been the early adopters

The automotive, aerospace & defence and capital goods industries have been early adopters of collaboration software. Some of the common characteristics these industries share include complex products with multiple components, sourced in different locations, manufactured and assembled and sold in another location. For example, in a Boeing 777 there are 3 mn parts from 500 suppliers around the world. While these customers have deployed sophisticated design and simulation tools they only began rolling out collaboration platforms in the last 5-10 years. The early adopters in these industries have been the OEMs, and over time they have enforced the adoption of similar tools by their supply chain. Cangchun Railway Corporation has reduced its new product development cycle time by 30%, improved its on-time delivery rate by 20% and shortened its R&D cycle time by 30%.

Adoption among the supply chain has accelerated in the last 3-4 years as part of a process to distribute risk, reduce cost and increase agility. For example, Faurecia has moved from 30% common development processes to 80% thereby enabling globally spread design teams to work on a single unified platform. But most importantly, it has also allowed these companies to distribute risk across partners in high value projects - for example 80% of the production of the Boeing 787 was been outsourced – the largest for any aircraft built. These are expected to bring significant benefits, including a reduction in operating costs through better planning and optimisation of supply chain, reduction in design cycle times for new vehicle/aircraft models, implementation of the “platform” approach for vehicle design whereby existing design data can be re-used etc. For example Boeing 787 production assembly time was reduced by 75% to 3 days versus previous models.

Energy, consumer products, retail & hi-tech are new adopters

Collaboration tools are being increasingly adopted in newer verticals like CPG (consumer packaged goods), retail & apparel, life sciences and high technology/electronics. Increased global competition, and a need to create newer differentiating products faster, and to reduce new product development costs are the key factors driving this adoption.

As the industry leaders in these verticals expand their presence across geographies to drive newer revenue streams and source materials through their partners across the world, we believe that the need for collaboration tools will increase significantly in the near to medium term. Companies are using collaboration tools for varied enterprise functions including governance, global sourcing, IP lifecycle management and live collaboration to accelerate their innovation process by knowledge and work sharing with their partners and suppliers. One of the best examples to showcase use of collaboration/product data management tools is CPG leader P&G. P&G sells most of its products for less than US\$10 each to more than 3.5 bn of its consumers worldwide. Hence, strict control of costs is key for profitability. P&G is now using ENOVIA (Dassault Systemes) as its firmwide standard to streamline its processes across product lines and partners to ensure highest standards of product quality are met.

The Corporate Standards System (CSS) at P&G based on ENOVIA is used by 12,000 P&G employees in the purchasing and development teams to centrally manage more than 1.2 mn specifications for its products worldwide, resulting in a savings of close to US\$250 mn (on annual spend of \$1.8 bn). Collaboration systems have also enabled P&G to reduce its review cycle times to 10 days from 30 days, thereby accelerating innovation.

Complying with regulatory requirements the tipping point?

Until now, the implementation of collaboration systems has been contingent on a large element of the back end infrastructure being in place (e.g. ERP, design and SCM systems) first. However, with increased regulatory scrutiny, we believe adoption of collaboration tools may have reached a tipping point. This is best seen in the oil & gas industry. One of Aveva's major customers, BP, has begun to roll out its AVEVA NET product as it seeks to gain more visibility into the safety of its processes and to improve the maintenance and operation of existing assets. The catalyst behind this roll out was the Texas Refinery incident in 2005 and the Gulf of Mexico incident in 2010. For example, in the oil & gas industry, often the build and construction of an asset is by one vendor with the operation & maintenance conducted by another. With limited cooperation between the two, design and operations data is not shared, increasing risks and liabilities for the owner (in this case BP). Given increasing scrutiny of product data and significant possible liabilities for owners, adoption of this software is now at a tipping point, irrespective of if the back-end is implemented.

Top Collaboration plays – Dassault Systemes & Aveva

We believe Dassault Systemes and Aveva are excellent ways to play the theme of collaboration software. For both companies, collaboration software-related product cycles (ENOVIA V6 in the case of Dassault) and (AVEVA NET in the case of Aveva) form a key part of our investment thesis. We believe AVEVA NET has the potential to double Aveva's revenues over the next five years and offers blue-sky value at the current share price. We note that 80% of Dassault's CAD installed base does not use a collaboration tool, providing significant scope for cross-selling. As a result, success of the ENOVIA V6 product cycle adds an incremental 3-4 percentage points to Dassault's medium-term revenue growth rate, underpinning our above-consensus estimates.

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Goldman Sachs International

Can it get any more global?

Simon Schafer uncovers the size, depth and importance of the supply chains that sit behind key consumer electronic products

The continued growth of consumer electronics products, especially that of Smartphone's and "Tablet" computers, has also required an enormous expansion of the supply chain. Apple's Supplier 2010 progress report included first-time audits of 97 facilities, in addition to comprehensive repeat audits of 30 facilities, for a total of 288

supplier facilities audited since 2007 alone. And that is just Apple. Apple's latest 10-Q filing suggested that the company had outstanding off-balance sheet third-party manufacturing commitments and component purchase commitments of an astounding US\$11bn on components.

Apple's supply chain

Europe (Chip Design)	US (Chip Design/Manufacturing)	Taiwan (Chip Manufacturing / Assembly)	China Assembly	Samsung (Components)	Japan (Chip Manufacturing)
ARM Holdings (Chip IP) Imagination Tech (Chip IP) Dialog Semi (Power IC) STMicro (Gyro IC)	Broadcom (Connectivity) Cirrus Logic (Audio) Qualcomm (Cellular) Texas Instruments (Screen IC) Intel Infineon (Cellular) Samsung Austin	TSMC Foxconn Hon Hai Catcher Pegatron Simplo	Foxconn Hon Hai Catcher Pegatron Wintek	Samsung	Elpida (DRAM) Toshiba (NAND) Sony (Camera Module) Murata (chip assembly)

Source: Goldman Sachs Research.

Not only is spend on component supplies and assembly and manufacturing very sizeable, it is also extremely complex given its global nature and reliance on interconnected supplier agreements: Apple may design its iPhone 4s in Cupertino, CA, but final assembly is most likely to take place in China. But necessary components may have been designed the UK (including intellectual property from ARM Holdings and Imagination Technologies), in Germany (Dialog Semi's power management chip for instance), or in France (STMicro's accelerometer, for example). Those in turn are likely to be produced in Taiwan (at TSMC, the world's largest semiconductor foundry), in Japan (including Memory chips from Toshiba and Elpida), or even in the US (at Korean vendor Samsung's Austin TX plant), before being distributed to China for final product assembly. And all to be shipped (or even flown at some expense) back to London or San Francisco.

Finding the weakest link

Recent events have also highlighted how fragile global supply chains can become, and how one weak link can cause a range of problems and repercussions for availability and functionality of products to the end-consumer, as well as the entire supply chain.

Take the role of Renesas following large-scale damage to manufacturing capability in Japan following the March 2011 earthquake and tsunami. Renesas is the world's largest manufacturer of microcontrollers for the automotive industry, with close to 40% market share (a crucial component in car and industrial electronics). Significant damage to output capability at its Naka plant caused two quarters' worth of output delay at some of the world's largest car makers, given the dependence on Renesas, impacting 2011 global car production by 5% according to our autos team (20% for Japan alone).

Take what was reportedly a faulty switch in a UK-based data centre at RIM in mid-October, the maker of Blackberry mobile devices: a single component fault that can cause broad-based service outages and delays over three days in Europe, the Middle East, India and Africa, 1.5 days in Latin America and Canada, and one day in the United States. Consider last week's flooding in central and northern Thailand which is having a potentially large impact on the production of critical components for hard disc drives used in PCs. Nidec (75% global market share in lens coating materials for HDDs)

has 20%-30% of the total lens-coating production in Thailand currently suspended, and Minebea and Alphana have also suspended production. Given relatively tight inventory management in the chain (perhaps four weeks' worth of critical stocks), this is only manageable without much of an impact if production can restart efficiently within one month. Otherwise, component availability delays could adversely affect delivery schedules of hard disc drives (and therefore PCs) for the Christmas shopping season. And will we really be able to get one of Apple's MacBook Pros' for Christmas, given casing supplier Catcher's ongoing dispute with frustrated neighbouring residents? Catcher's Suzhou factories in China received local authority notices to halt some of its production processes because of pollution, impacting sales by an estimated 20% in October (and 40% in November if production cannot be re-started by the end of October).

Can Inventory management be "real time"?

A fragmented supply chain with multiple "connecting dots" has also often led to volatile swings in overall inventory along the chain, causing sharp swings in quarterly order patterns for chip manufacturers, distributor and assemblers. The semiconductor industry in particular (given its capital intensity and pace of continued innovation leading to quick obsolescence cycles), tends to respond quickly to quarterly inventory trends, causing large swings compared to "normalised" long-term trend growth of unit demand. While the amplitude of swings has improved since the burst of the technology bubble and the inventory glut of components that followed, they remain a feature of the industry

As long as innovation cycles remain as rapid as they have been in the past, and capital intensity dictates an environment of "specialised division of labour", the world's supply chains are unlikely to become any simpler soon. This is globalisation at an extreme, manufacturing mobile devices with "always on" connectivity to allow greater interconnectedness.

Simon F. Schafer

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A world apart for GS SUSTAIN winners

Andrew Howard, from GS SUSTAIN argues that global growth and global exposure are key drivers of sustained competitive advantage

The GS SUSTAIN team has today published “The whole world’s the stage: Focus on global leaders”, a report examining the importance of a global perspective to assessing companies’ fundamental strengths. In our experience, most investors are constrained by regional mandates limiting exposure to global equity markets. However, the companies in which they invest compete in increasingly global industries and assessing their abilities sustain competitive advantage relative to global, rather than local, peers is critical to identifying those leaders well placed to maintain competitive advantage, superior cash returns and ultimately to deliver outperformance.

Ongoing concerns over the economic outlook, to which markets have re-based in recent months, reflect a microcosm of a long-term structural shift in the balance of global economic power that is driving realignment in equity market sales and operating assets.

While Goldman Sachs’ economists have lowered their GDP growth estimates in recent weeks, with both France and Germany now forecast to slip into mild recessions, their 2012 real global growth forecast of 3.5% is virtually equivalent to the 10-year average pace. Economic concerns notwithstanding therefore, the key conclusion is that divergence in the pace of growth in today’s advanced and emerging economies is accelerating.

This economic realignment is evident in the revenues and operating assets of global equities. The share of global sales generated in, and operating assets located in, emerging markets have roughly doubled to c.30% since 2005. Companies listed in every region have become increasingly reliant on emerging market revenues; while international sales represent only c.20% of the sales generated by European and North American companies, revenues from those international markets have contributed c.60% and 30% of the total top line growth in those regions since 2005, giving structural advantages to companies with global footprints.

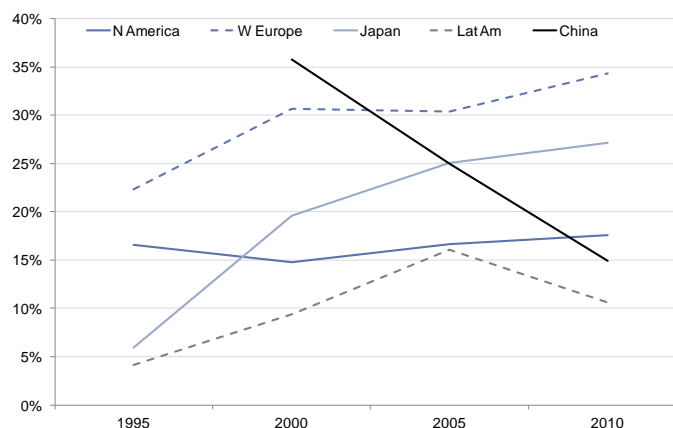
While rising integration of global industries is yielding opportunities for companies exposed to growth markets, competitive challenges are also growing. Competition for growth in emerging markets – from domestic and international companies – is rising as developed economies slow; on average, Chinese companies have delivered faster revenue growth in their domestic market than European or North American companies have achieved in their Chinese sales. Similarly, European, North American and Japanese companies are losing ground to growing competition from international companies in their domestic markets.

Companies with top-quartile emerging market exposure in each global sector generate on average cash returns over 20% higher than their peers, and we forecast 50% faster growth over the next three years for those companies. Exposure to growth will remain a key element of sustained profitable growth in many industries, but identifying those companies able to successfully take advantage of that growth exposure through the strength of their competitive positions relative to global peers is ultimately critical for generating long-term outperformance.

While many investors are constrained by regional mandates and benchmarks, the companies in which they invest increasingly compete in global industries and in our view should be assessed

accordingly. The relationship between country benchmarks and stock performances is declining as the importance of country impacts on performance become more muted. GS SUSTAIN provides an objective framework to compare companies on their abilities to sustain industry-leading cash returns vs. global peers.

Developed market companies are increasingly reliant on international sales, emerging market companies less so % of sales generated outside of the domestic region



Source: DataStram.

Comparison of the cash returns generated by companies in regional sectors highlights sizeable disparities in profitability across regional industries. Emerging market companies typically generate higher cash returns than their developed market peers. Across developed markets, Japanese companies on average generate lower cash returns than global sector averages in every industry, US companies are stronger on average, and are typically very strong in human capital, knowledge-intensive industries, while European companies lie between the two, with typically mediocre cash returns with few areas of global strength across the region. Within Europe, Scandinavian, Swiss and UK-listed companies on average generate stronger returns than Eurozone peers.

GS SUSTAIN is Goldman Sachs’ long-term investment framework, applied across each global industry. It is based on globally consistent, objective measures of performance across three key elements of corporate performance:

- Cash returns: Proprietary measure of the cash flow companies generate relative to the capital invested in their business.
- Industry positioning: Objective measures of the strategic strength of companies’ business models and structural drivers of cash returns.
- Management quality: Quantifiable analysis of the effectiveness with which companies recognize, address and manage the key environmental, social and governance issues facing their industry.

Companies with demonstrable leadership on all three of these dimensions, relative to global peers, are included in the GS SUSTAIN Focus List of companies well placed to deliver long-term outperformance through sustained competitive advantage, superior cash returns and sustainable growth. Since its launch in June 2007, the GS SUSTAIN focus list has outperformed the global MSCI ACWI benchmark by 40%.

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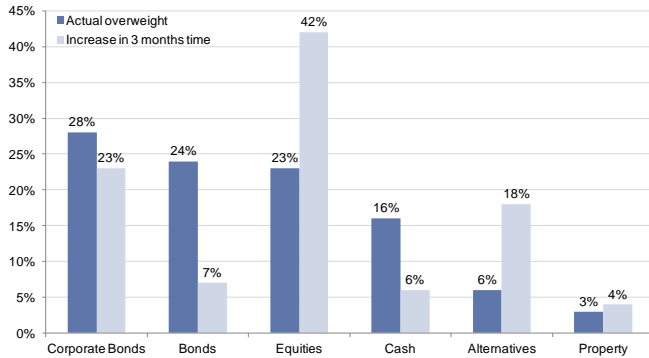
Goldman Sachs International

Six of the best – our favourite charts

In our six of the best section, we pull together a pot pourri of charts that we hope you find interesting. They will be different in each edition but hopefully always of note.

Our survey says...

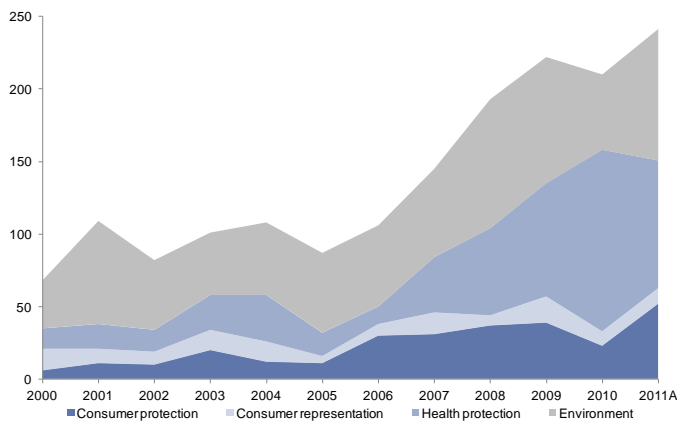
Survey from our European Pension & Insurance Conference



Note: More than 100 investors replied to the questions: "In terms of asset allocation, which asset class are you most overweight in?" and, "Which asset class do you intend to increase most over the next 3 months?"
Source: Goldman Sachs Global ECS Research.

The regulatory squeeze

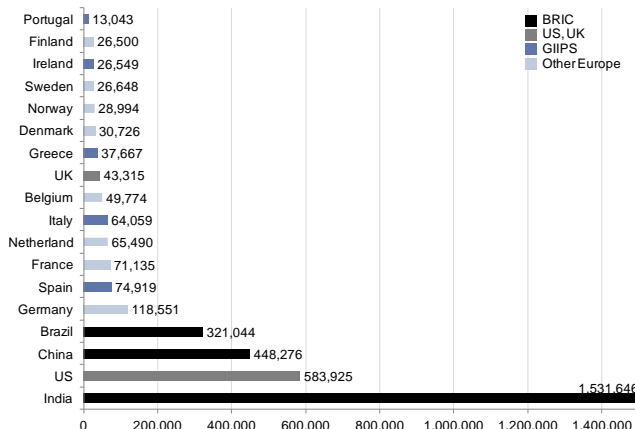
Number of pieces of legislation introduced in the EU, by category



Source: Europa.

People power

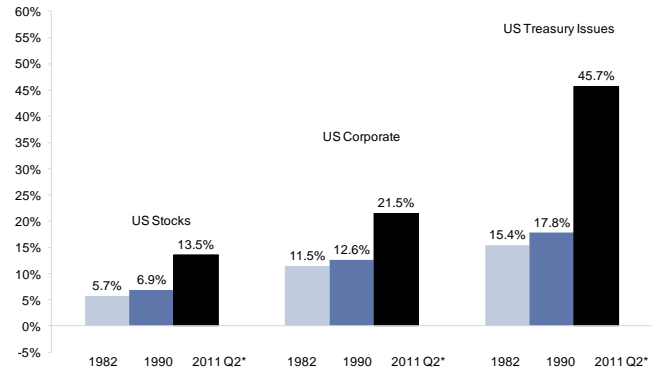
Number of citizens an MP represents



Note: Calculated using unicameral or bicameral MPs total when available.
Source: International Labour Organisation, Country data.

Overseas investors prefer bonds

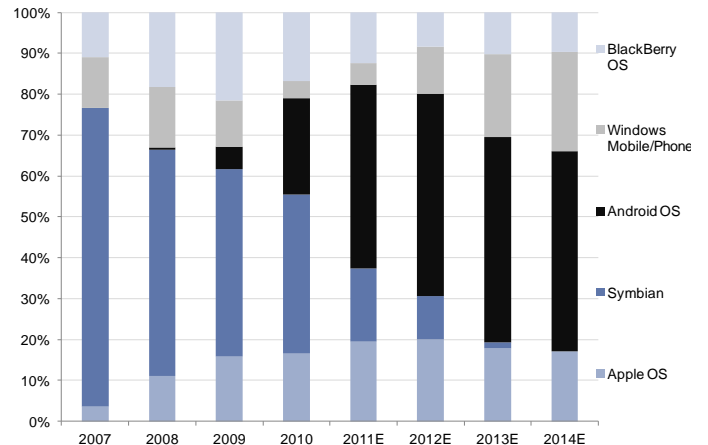
Foreign ownership of US stocks and bonds



Note: * Data for 2Q2011 are preliminary.
Source: Federal Reserve Board, Goldman Sachs Global Markets Institute.

Androids take over

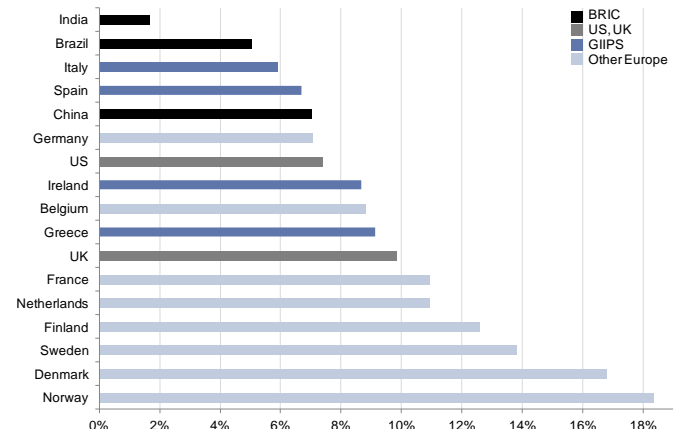
Mobile OS market share



Source: Gartner, Global Mobile, World Bank, Goldman Sachs Research estimates.

The size of the state

Number of public sector employees to the general population (%)



Source: International Labor Organization, UN.

Four stocks with global flows

A.P. Moeller-Maersk

Key data	Current
Price (Dkr)	35,000.00
12 month price target (Dkr)	50,000.00
Upside/(downside) (%)	43
Market cap (Dkr mn)	153,846.0
Enterprise value (Dkr mn)	364,469.8

	12/10	12/11E	12/12E	12/13E
Revenue (Dkr mn)	315,396.0	316,190.8	332,219.1	349,821.1
EBIT (Dkr mn)	55,396.0	50,632.2	58,238.9	61,478.6
EPS (Dkr)	5,155.16	3,123.44	4,909.74	6,547.30
EV/EBITDA (X)	4.6	4.6	4.0	3.8
P/E (X)	9.0	11.2	7.1	5.3
Dividend yield (%)	0.7	2.9	2.9	2.9
FCF yield (%)	13.9	0.8	15.1	11.6
CROCI (%)	11.7	8.3	9.1	9.9
CROCI/WACC (X)	--	--	--	--
EV/GCI (X)	0.7	0.6	0.5	0.5

rising for the past couple of weeks and now stands at 2.3% of the fleet (vs. 12% in 2009). We expect this number rise further, driven by waning interest for re-lets and a depressed spot market (forcing liners with weaker balance sheets to idle their fleets). (2) Cascading of smaller ships from main lanes to secondary lanes. (3) More order delays/cancellations, as owners struggle to finance vessel orders placed at the peak of the cycle when asset values were 30% above current levels. In the Oil and Gas segment, we expect news on the commercial viability of the Chissonga (Angola) and Itaipu/Wahoo fields (Brazil) in 4Q11.

Maersk trades close to levels associated with its trough earnings and at book value multiples (in line with 1Q09) despite a higher oil price and stronger demand in containers. Our 12-month SOTP-based price target is Dkr50,000. The key risks to our price target are a lower oil price, a narrowing crack spread and an absence of supply adjustments in containers and trade tariffs.

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Prices as the close of October 19, 2011.

Aveva

Key data	Current
Price (p)	1,430
12 month price target (p)	2,550
Upside/(downside) (%)	78
Market cap (£ mn)	975.2
Enterprise value (£ mn)	777.3

	3/11	3/12E	3/13E	3/14E
Revenue (£ mn)	174.0	207.2	258.1	318.3
EBIT (£ mn)	50.7	64.9	86.2	113.3
EPS (p)	49.00	69.20	92.21	120.89
EV/EBITDA (X)	14.7	11.2	8.0	5.7
P/E (X)	29.0	20.7	15.5	11.8
Dividend yield (%)	1.3	1.9	2.6	3.4
FCF yield (%)	NM	NM	NM	NM
CROCI (%)	42.5	77.6	83.5	98.3
CROCI/WACC (X)	4.4	8.0	8.6	10.1
EV/GCI (X)	9.6	10.0	8.6	7.1

design solutions across multiple emerging markets (Brazil, China, Russia, Middle East) and increased adoption of AVEVA NET in the Oil & Gas industry. In particular, we expect Aveva NET to become an industry standard in the product lifecycle segment in the Oil & Gas and power verticals, similar to Aveva's design solutions in the 3D design segment, driving exponential growth in the medium term. We expect Aveva to deliver a c.22% revenue CAGR and a c.31% EPS CAGR over FY11-14E. We are 7%, 20% and 32% ahead of Bloomberg consensus for FY11, FY12, FY13 revenues respectively.

Aveva provides exposure to global themes, economic realignment and oil offshore expansion. Aveva's dominant position in the attractive 3D plant design software market and high BRICs/emerging market exposure (c.65% of revenues) underpins its strong industry positioning. We expect Aveva to grow faster than the market's 9% CAGR over the next few years. We believe Aveva NET is an important product differentiator for the company, and that it has the potential to double the group's sales in the coming years, owing to the product's unique positioning and regulatory demand. We expect Aveva NET to enable Aveva to gain incremental market share vs. its competitors, and capture a sizeable market opportunity. The company's high recurring revenue model (c.65% of group sales) and predominantly organic growth enable it to generate the best returns in the sector. A high percentage of recurring revenue additionally provides strong top-line visibility. Aveva is on the Conviction Buy List, the UK Relative Value List, is a GS SUSTAIN Emerging Industry leader and is on the DOR Focus List. Risks to our price target include economic weakness in EM and exposure to cyclical end-market capex, particularly in marine technology, adoption rates, access to financing for Aveva's customers, acquisitions and revenue concentration.

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Price as the close of October 19, 2011.

The great Dane is back

AP Moeller-Maersk stands out as one of the best ways to play the global trade theme: more than 50% of its net income is from global trade derivatives businesses. The company owns Maersk Line, the largest container line in the world, APM Terminals (with interests in 60 ports, of which 56% are located in emerging markets), and Maersk Tankers, a large fleet of chemicals, crude and products tankers.

We have a Conviction Buy on the stock: after two quarters of sub-breakeven freight rates on main lanes on the containers side, we expect the industry to begin a self-healing process through supply adjustments, as in 1Q09. Then, supply declined by c.20%, lifting rates well above breakeven levels months before demand improved.

Supply adjustments are a key catalyst: (1) The number of lay-ups has been rising for the past couple of weeks and now stands at 2.3% of the fleet (vs. 12% in 2009). We expect this number rise further, driven by waning interest for re-lets and a depressed spot market (forcing liners with weaker balance sheets to idle their fleets). (2) Cascading of smaller ships from main lanes to secondary lanes. (3) More order delays/cancellations, as owners struggle to finance vessel orders placed at the peak of the cycle when asset values were 30% above current levels. In the Oil and Gas segment, we expect news on the commercial viability of the Chissonga (Angola) and Itaipu/Wahoo fields (Brazil) in 4Q11.

Maersk trades close to levels associated with its trough earnings and at book value multiples (in line with 1Q09) despite a higher oil price and stronger demand in containers. Our 12-month SOTP-based price target is Dkr50,000. The key risks to our price target are a lower oil price, a narrowing crack spread and an absence of supply adjustments in containers and trade tariffs.

Analyst details: *Edouard Baldini, Tel: +44 (20) 7774-5715; email: edouard.baldini@gs.com – Goldman Sachs International.*

Prices as the close of October 19, 2011.

Emerging market leader with best-in-class industry positioning

Aveva's current valuation (13x 2012E P/E ex-cash) is at a c.10% discount to the PLM peer group, despite better structural revenue growth, operating margins and cash returns. Our 12-month price target of 2,550p is based on a 70% weighting to our core P/E-based valuation of 2,350p (26x FY12E PF EPS) and a 30% weighting to an M&A-based valuation of 3,030p. Aveva is a premier strategic asset in European software in our view and may appeal to many potential acquirers including PLM peers (Dassault Systems, Autodesk) and industrial vendors (Siemens, ABB).

We are significantly ahead of consensus, reflecting our positive view on Aveva's best-in-class industry positioning and structural growth potential. In the near term, we expect multiple growth drivers, including adoption of

Intertek

Key data	Current
Price (p)	1,955
12 month price target (p)	2,984
Upside/(downside) (%)	53
Market cap (£ mn)	3,114.3
Enterprise value (£ mn)	3,756.9

	12/10	12/11E	12/12E	12/13E
Revenue (£ mn)	1,374.2	1,705.9	1,973.6	2,170.9
EBIT (£ mn)	214.6	263.4	317.8	359.6
EPS (p)	90.96	105.06	126.51	145.32
EV/EBITDA (X)	9.7	11.1	8.4	7.4
P/E (X)	17.3	18.6	15.5	13.5
Dividend yield (%)	1.8	1.7	2.1	2.4
FCF yield (%)	5.1	4.7	6.3	7.0
CROCI (%)	21.0	18.7	18.7	18.9
CROCI/WACC (X)	--	--	--	--
EV/GCI (X)	2.3	2.1	1.9	1.7

Structural leader in testing times

Consistent growth, consistent performance: Intertek maintained organic revenue and EBITDA growth through the previous recession, something we believe is sustainable as a result of ongoing structural growth drivers, a rational acquisition track record, industry-leading market positioning, driving sustainable barriers to entry, and high returns. **Reputation and quality the key barriers to entry:** Given the relatively low cost of testing (as a percentage of product development/production), we believe reputation and quality, rather than price, are key for outsourcing, with customers unlikely to trust their brand-value to an untried new market entrant: as evidence, 13 of the top 15 testing companies were founded over 100 years ago. Our competitor analysis shows that only 3 companies (ITRK, BVI, SGS) are truly diversified global players, explaining why we think competition for global contracts is less than for local ones.

China risks overplayed, emerging market opportunity remains: We believe China risks are overplayed for two main reasons: (1) The majority of China exposure is in consumer testing, where c.95% of samples tested are for products destined for western end-markets, and therefore not exposed to a potential GDP growth slowdown in China; (2) The sharp increase in Chinese wage inflation impacted Intertek's consumer margin in 1H 2011, not because it inflated its own cost base, but because it forced its customers to find alternative low-cost manufacturing regions. This sudden shift reduced near-term utilisation and required a shift in lab capacity to these new geographies. In a normal high-inflation environment, ITRK is able to offset these pressures by gradually shifting capacity, and by filling existing capacity with higher-value testing as seen in 1H11. Longer term, we view China as an opportunity, with the growing middle class demanding increased consumer protection, and regulations which should drive further outsourced testing of products destined for the domestic market. **Intertek is a Conviction Buy. We have a 12-month price target of 2,984p:** ITRK is in the top quartile of business services stocks on our GS SUSTAIN-based framework analysis of growth, sustainability and returns. We value ITRK at 12.0x 2013E EV/EBITDA, discounted to present value. **Key risks to our price target** include sharp shifts in customer locations, lower capex from major energy and mining customers and a further slowdown in global trade (which accounts for c.30% of ITRK's growth).

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Price as the close of October 19, 2011

Visa Inc.

Key data	Current
Price (\$)	90.08
12 month price target (\$)	106.00
Market cap (\$ mn)	64,317.1

	9/10	9/11E	9/12E	9/13E
Revenue (\$ mn)	7,892.5	9,180.2	9,891.2	10,924.1
Net income (\$ mn)	2,859.1	3,544.1	3,971.6	4,495.3
EPS (\$)	3.87	5.00	5.75	6.60
P/E (X)	23.3	18.0	15.7	13.6
P/B (X)	2.2	2.3	2.1	1.9
ROA (%)	NM	NM	NM	NM
ROE (%)	NM	NM	NM	NM
Equity/assets (tang) (%)	19.9	29.7	42.8	53.1
Pretax margin (%)	57.2	60.9	63.2	64.8
	6/11	9/11E	12/11E	3/12E
EPS (\$)	1.26	1.28	1.43	1.42

Secular tailwinds continue to power growth

A unique combination of secular growth and EPS defensiveness. We expect V to deliver double-digit EPS growth (at least 15% yoy) through FY13 given the secular shift to electronic payments, strong global consumer volume/transaction growth and ongoing traction in emerging payment technologies (prepaid, online and mobile). Recent data points from MA/V, issuing banks and merchant acquirers suggest that purchase volumes remain robust despite macro headwinds.

International to drive near-term growth, emerging payments represent a long-term opportunity. With 85% of global transactions still cash-based, and a rising global affluent/middle class, we see plenty of growth runway in international markets. Importantly, while International remains a key driver of the model (accounting for 60% of revenue growth in recent quarters), V maintains limited exposure to Europe (no direct exposure).

Over the long term, we expect emerging payments to become an increasingly important driver given V's dominant role in electronic payments. Simply put, any emerging payment technology will need to ride on existing current payment rails (including V, MA, AXP and DFS) in order to scale, which will only add incremental volume. **Robust FCF and margin profile makes model defensive.** We believe V's industry-leading ROC (40%+ in FY12E), robust annual FCF (US\$2 bn+), solid margin profile (60%+) and capital allocation stewardship will buffer EPS in a tepid economic environment and support the shares. **Our 12-month US\$106 price target implies 17% upside potential** and is based on a weighted average model incorporating our sector-relative Investment Framework, CY12E P/E, and CY12E EV/EBITDA (implying a CY12E P/E of 18X). We expect to see continued multiple expansion as investors gradually shift their focus to fundamentals and away from regulatory uncertainty. We remain confident that V will deploy numerous mitigation strategies to protect its dominant share of the US debit market (+50%). In particular, we expect V's recently announced pricing changes, increased focus on merchant incentives and product/technology innovation (the forthcoming V mobile wallet and the push for chip-based technology) to limit any market share loss in US debit. **Key risks to our price target** include lower volumes, slower cross-border growth, and new entrants.

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Price as the close of October 19, 2011.

Investment list performance

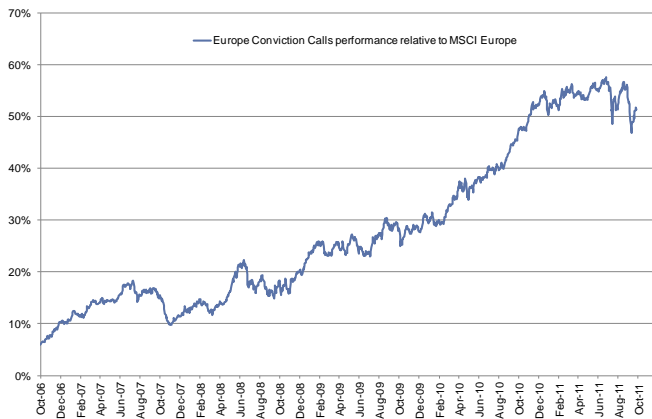
The charts below show the performance of our four key investment lists. Our Conviction List represents our sector analysts' highest conviction ideas (typically making up 10% of their coverage). We show its performance versus our entire coverage and against the MSCI Europe.

The Directors of Research Focus List comprises the "best of the best" Conviction ideas as selected by our Directors of Research. It represents their pick of our strongest Conviction calls and also contains GS SUSTAIN Focus List names.

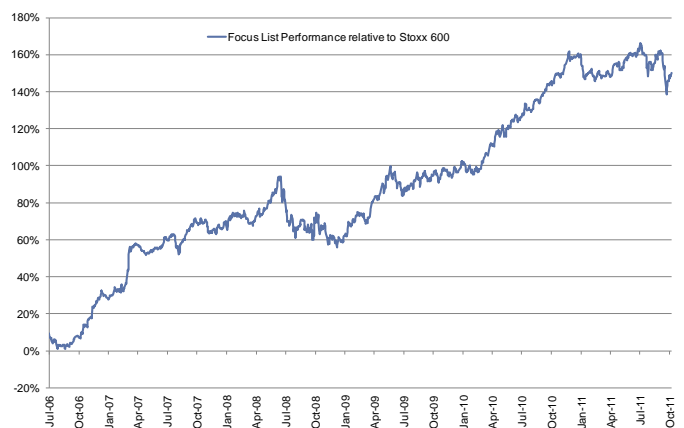
The GS SUSTAIN Focus List brings together the leaders identified in each global sector, based on objective, quantifiable measures of returns, industry positioning and management quality. Since its launch in June 2007, the GS SUSTAIN Focus List has outperformed the MSCI All Country World index by 37%.

The UK Relative Value List is constructed using our UK conviction call ideas (ex small cap oil E&P). Conviction Buys and Sells are matched against one another and the list looks to create an absolute return.

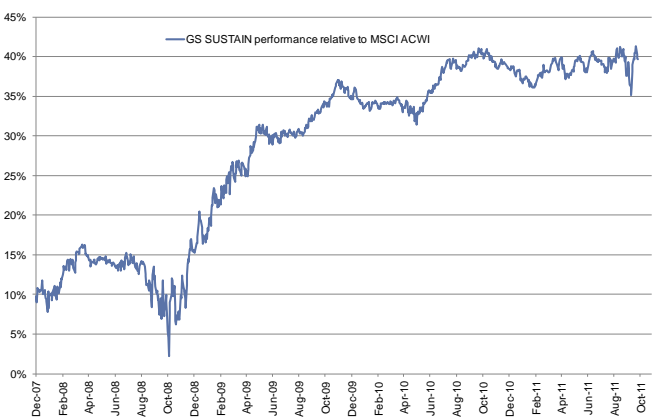
Conviction List performance



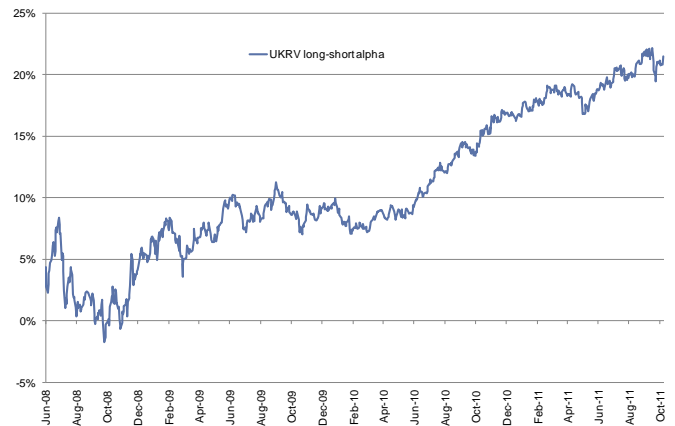
Directors of Research Focus List performance



GS SUSTAIN Focus List performance



UK Relative Value List performance



Source: Goldman Sachs Research.

Note: Results presented should not and cannot be viewed as an indicator of future performance. Performance is calculated on an equally weighted basis relative to the MSCI World index (market-cap-weighted total return series in US\$). Performance calculations assume closing levels with no bid/ask spread and no commission.

Alt AC

I, Jeffrey Currie, hereby certify that all of the views expressed in this report accurately reflect my personal views, which have not been influenced by considerations of the firm's business or client relationships.

Reg AC

Each equity and strategy research report excerpted herein was certified under Reg AC by the analyst primarily responsible for such report as follows: I, Name of Analyst, hereby certify that all of the views expressed in this report accurately reflect my personal views about the subject company or companies and its or their securities. I also certify that no part of my compensation was, is, or will be, directly or indirectly, related to the specific recommendations or views expressed in this report. The legal entity for all analysts is Goldman Sachs International unless otherwise noted.

Investment Profile

The Goldman Sachs Investment Profile provides investment context for a security by comparing key attributes of that security to its peer group and market. The four key attributes depicted are: growth, returns, multiple and volatility. Growth, returns and multiple are indexed based on composites of several methodologies to determine the stocks percentile ranking within the region's coverage universe.

The precise calculation of each metric may vary depending on the fiscal year, industry and region but the standard approach is as follows:

Growth is a composite of next year's estimate over current year's estimate, e.g. EPS, EBITDA, Revenue. **Return** is a year one prospective aggregate of various return on capital measures, e.g. CROCI, ROACE, and ROE. **Multiple** is a composite of one-year forward valuation ratios, e.g. P/E, dividend yield, EV/FCF, EV/EBITDA, EV/DACF, Price/Book. **Volatility** is measured as trailing twelve-month volatility adjusted for dividends.

Quantum

Quantum is Goldman Sachs' proprietary database providing access to detailed financial statement histories, forecasts and ratios. It can be used for in-depth analysis of a single company, or to make comparisons between companies in different sectors and markets.

Disclosures

Coverage group(s) of stocks by primary analyst(s)

Edouard Baldini: Europe-Transport, Europe-Travel & Leisure. Mohammed Moawalla: Europe-Software. Julio C. Quinteros Jr.: America-ATM/POS and Self-Service, America-IT Consulting and Outsourcing, America-Transaction Processors. John Woodman: Europe-Business Services.

America-ATM/POS and Self-Service: Diebold, Inc., NCR Corp., VeriFone Systems, Inc..

America-IT Consulting and Outsourcing: Accenture Plc, Amdocs Limited, CGI Group Inc., CGI Group Inc. (US), Cognizant Technology Solutions, Computer Sciences Corp., Convergys Corporation, CSG Systems International, Inc., ExlService Holdings, Inc., Fidelity National Information Svcs., Fiserv, Inc., Genpact Ltd., Lender Processing Services, Inc., Motricity, Inc., NeuStar, Inc., Pitney Bowes Inc., Sapien, Synchronoss Technologies, Inc., Towers Watson & Co., WNS (Holdings) Ltd..

America-Transaction Processors: Automatic Data Processing Inc., Equifax, Inc., FleetCor Technologies, Inc., Global Payments Inc., Green Dot Corp., Heartland Payment Systems, Inc., Higher One Holdings, Inc., Mastercard Inc., NetSpend Holdings, Inc., Paychex, Inc., Solera Holdings, Inc., Total System Services, Inc., Visa Inc., Western Union Co., Wright Express Corp..

Europe-Business Services: Adecco, Aggreko, Amadeus IT Holding SA, Austrian Post, Babcock International, Berendsen Plc, Brenntag AG, Bunzl, Bureau Veritas, Capita Group, Deutsche Post, Electrocomponents, Eurofins Scientific, Experian, G4S Plc, Hays plc, Intertek Group, Michael Page International, PostNL, Premier Farnell, Randstad Holdings, Regus Group PLC, Rentokil Initial, Rexel, Robert Walters, Securitas AB, Serco, SGS, SThree, TNT Express N.V., Travis Perkins, Wolseley.

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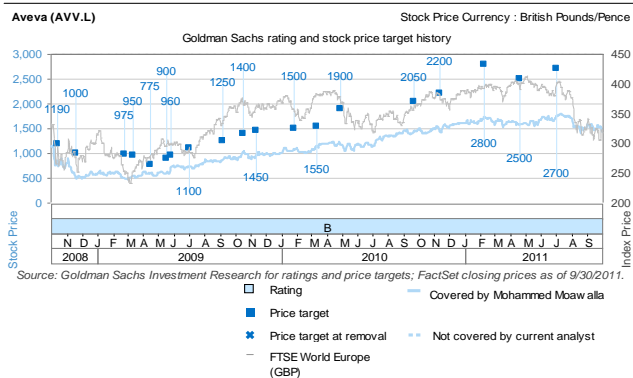
Distribution of ratings/investment banking relationships

Goldman Sachs Investment Research global coverage universe

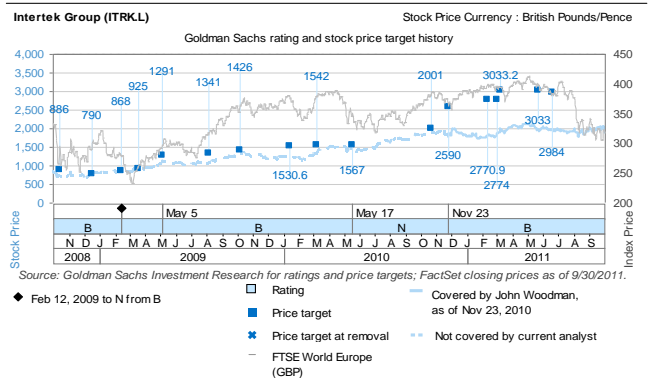
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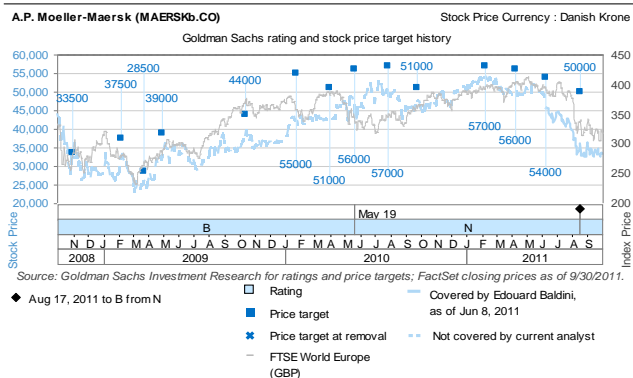
Price target and rating history chart(s)



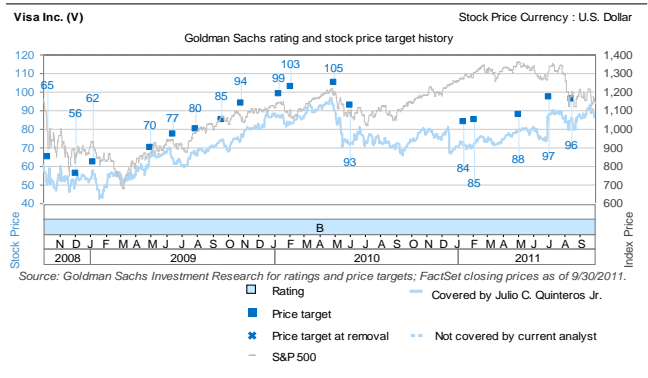
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