LINKS ANALYTICS

Global Systemic Risks

2012

GLOBAL SYSTEMIC RISKS

2012

a LINKS Analytics annual review

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INTRODUCTION

Asset price bubbles are here to stay. No other attribute of economic development has had so much attention from regulators, politicians, economists and market participants. The words “never again” have sounded on multiple occasions over the past hundred years, and yet bubbles continue to form and burst with devastating consequences as often as ever. We are convinced that asset bubbles are inseparable from the way we live.

Gradually deflating asset bubbles results in new bubbles elsewhere and prolongs the pain. Attempts to regulate or wish them away are equally futile. On the other hand, we have the ability to recognize asset bubbles early enough to minimize the damage to institutional asset pools.

LINKS Global Systemic Risks is not a set of hypothetical economic scenarios for stress tests, or a description of generic risks that we continuously face, such as political or environmental. Nor is it elaborate industry-specific research. We have used our background in global supply chains and the expertise of industry-insiders in order to identify and expose the actual asset price bubbles as they develop.

Asset price bubbles do not exist in isolation. There is always a global infrastructure and state of affairs that create and support them. And so we found that all the industry- and country-specific risk sources we had identified had many common drivers and linkages. We have called this combined picture the Global Risk Network. Understanding this integrated picture and protecting institutional assets against losses caused by adverse developments that could be foreseen is the mission of LINKS Analytics.

THE GLOBAL RISK NETWORK

The sources of systemic risk we have identified in many ways result directly from the existing imbalances in the global economy. Relentless pursuit of higher margins and capital efficiency in the West caused a major shift of low-return manufacturing from the West to China, which in turn had to stimulate the economy with large-scale infrastructure projects, because the low-return manufacturing failed to maintain China's growth after 2008. This large-scale infrastructure spending was mostly funded by local governments, which created the largest risk in the Global Risk Network: a local **government debt bubble in China** estimated by PBOC at $ 2.2 trillion, although our estimates are closer to $4 trillion.

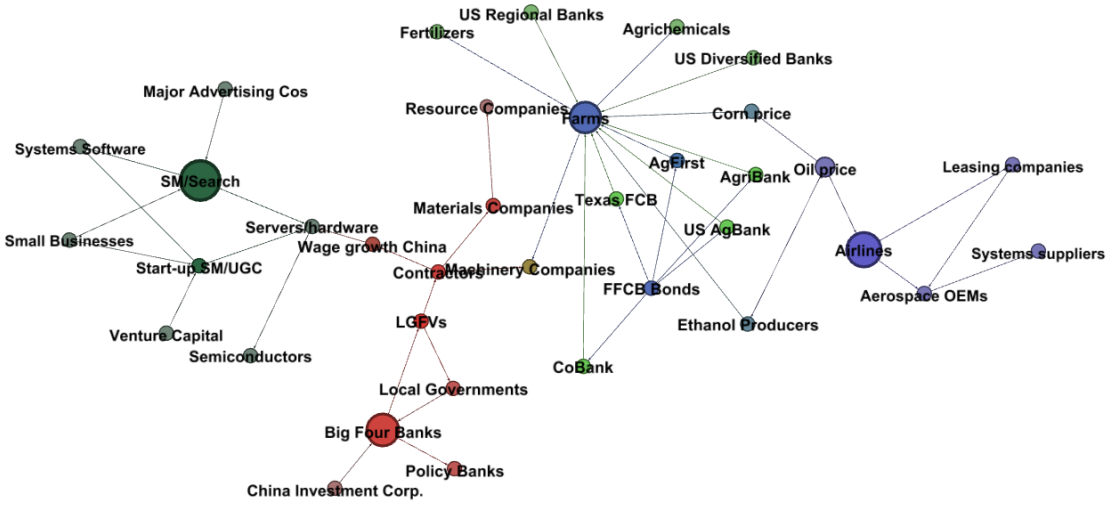
Growing economic and political insecurity in the US, which is partly due to the emergence of China as a major industrial power, has caused a major interest in real assets, particularly **US farmland**. Higher and more volatile oil prices and politically unstable sources of oil have prompted the US legislators to stimulate the adoption of oil alternatives in the form of bio-fuels, which in turn has created unusually high demand for corn and farmland. Price appreciation of farmland in the US at its peak was 25-30% a year. The artificial wealth effect has created an inflated economy in the US Midwest to the tune of $ 1.2 trillion.

US Technology industry is in early stages of the second asset bubble, this time driven by proliferation of social networking (SN) and user generated content (UGC) sites. Over the past decade the web development community has tried and failed to create genuinely new web-specific revenue sources. Industry leaders such as Google and Amazon, despite their size and prominence, are still fully dependent on real economy revenues competed away from traditional media. The size and growth of advertising revenue, which is the only real revenue source for SN/UGC companies is hardly sufficient to sustain the existing industry players, and yet, both VC and institutional investor money continues to flow into the industry, generating a "reality gap" of over $ 200 billion.

Another direct consequence of higher oil prices is the large-scale overinvestment in new aircraft, predominantly driven by **Asian and Middle Eastern airlines** with little experience of managing airlines through the business cycle. Just like in China, Middle Eastern countries stimulate their economies with asset-intensive businesses, which inflates prices and demand for aircraft. Higher oil prices also translate into greater attractiveness of more fuel efficient new aircraft versus perfectly viable but less efficient older aircraft. We estimate that the combination of these two effects has caused overinvestment in aircraft of up to $ 1 trillion.

Figure 1: LINKS Global Risk Network 2012

Global Risk Network consists of four clusters: China infrastructure, US technology, the Aerospace industry and US agriculture. Oil prices and wage levels in China connect and transmit systemic risks between the clusters.



In addition to these risk sources there are smaller elements in the Global Risk Network that do not cause immediate concern but may eventually grow in size and prominence. Among these milder risks we monitor:

- the automotive industry in China
- consumer finance, particularly student loans in the US
- the market for industrial metals

We did not incorporate these sources in our detailed analysis either because the overall size of the risk source was too small, or because there were tangible industry developments to support stronger than average growth and prices in the near term.

Two sources of risk warrant special treatment: the EMU crisis and energy prices. Although both of these sources were highlighted by LINKS in 2011, we decided not to focus on them in 2012 for two separate reasons.

EMU DEBT CRISIS

Sovereign debt crisis in the EMU countries is serious and may have disastrous implications for many institutional investors. We treat this risk as a near certainty, which means LINKS have little to add to the existing body of knowledge about the causes and effects of this crisis. LINKS flagged these risks in early- to mid-2010 and worked with institutions to restructure their portfolios accordingly.

Still, many institutions prefer to hold certain proportion of their assets in EMU debt, often not because they are certain about a positive resolution to the crisis, but because at the time of writing of this report these are the only sovereign debt instruments with positive real yield. Return on such a strategy is binary in nature and the outcome depends on a large number of predominantly political factors. Our mission is to forewarn. It is too late for that.

ENERGY PRICES

Oil price affects the Global Risk Network in a number of ways. It is both in the epicentre of all risks and a glue, connecting together various sources of risk. Based on what we know, on a stand-alone basis and in the world of pure economics oil prices would have declined significantly. However, near term oil price discovery, just as EMU crisis, is often driven by political influences.

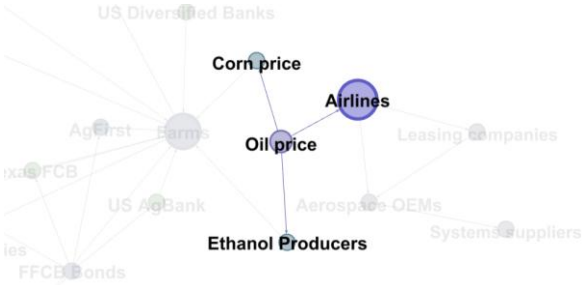
LINKS Global Risk Network enables us to draw reliable conclusions about the impact of ranges of energy prices on financial assets:

- A range of $30-50 is likely to trigger two of the risk sources: ME airlines and US Agriculture. Low petrol prices will drive ethanol and corn prices lower, causing a reassessment of US farmland pricing. The latter will have a major impact on the US agency bonds, US and European financials, US farm equipment and agrichemicals industries (Figure 2). Lower oil prices will impact the ability of Middle Eastern subsidized airlines to sustain their operations and will put the currently large aircraft order books at risk. Large Western airlines will prefer to fly relatively older aircraft due to the lower relative impact of energy efficiency. This will cause a severe slowdown in the global civil aerospace industry. Needless to say, integrated oil and oil services companies will suffer significant losses. The combined effect of all these losses is far greater and more immediate than the impact of lower energy prices on manufacturing costs. *Global Risk Network highlights the fact that we live in a world geared towards higher oil prices.*

- Significantly higher oil prices (above $150), on the other hand, will perpetuate the existing imbalances and create new ones. More alternative fuel technologies, such as hydrogen will attract regulatory blessing and create new forms of bubbles. Ironically, higher oil prices will not be beneficial for the aerospace industry, as non-subsidized airlines will be driven out of business.

Figure 2: Oil price and related systemic risks

Lower oil prices will impact ethanol and corn prices and drive the US farmland values lower. This will deflate the agricultural bubble in the US. Airlines will delay new aircraft orders and the Aerospace industry will suffer too.



Whichever scenario transpires, sharp moves in either direction will trigger a chain of events that will impact asset prices. We will assess this impact through the pathways highlighted in Global Risk Network and LINKS Net and will translate it into asset class returns.

METHODOLOGY

The competence of LINKS Analytics is in researching, modelling and analysing global supply chains. In this process we continuously examine and document specific supply chains in various countries and across borders. The result of all this is LINKS Net – a simulated network of companies, governments and consumers with their economic relationships.

All asset price bubbles historically have had certain geographic and industry context. Technology, mortgages, savings & loans, Asian banking, even the tulip mania in Holland were all concentrated in specific geography and industry. This is why we start our process of identification of systemic risk sources by going through a large number of countries and economic activities and looking for abnormally high returns and asset value appreciation rates.

Many of these shortlisted country-industry pairs have a valid reason for abnormal values and growth. We focus on areas that have a demonstrable gap between expectations and reality. We do not argue that these overly optimistic expectations will not materialize. We merely suggest that excessive growth expectations are the primary cause of overspending, inflated prices and disappointment. At this stage, we map the supply chain[1] and engage with industry insiders to test our hypothesis.

Following the initial mapping exercise, we run simulations. A typical simulation involves assuming that a certain part of supply chain loses certain proportion of revenues. The actual magnitude of stress depends on the assessment of the size of "the reality gap". We assess the impact of these simulations on the global network of companies: LINKS Net, which then helps us to estimate the impact on major asset classes. For instance, although it is clear that higher oil prices will impact the civil aerospace industry, LINKS Net enables us to estimate the impact of higher oil prices further in the economy, including all secondary, tertiary suppliers, impact on the consumer etc.

Often it is near impossible or impractical to map the whole supply chain. In some cases, such as US Agriculture, certain industry cluster are far too fragmented (there are over 360,000 farms in the US) to map in detail. In these cases we combine similar entities in groups and treat them as one. So long as there is a large commonality between constituent companies, this approach yields sensible results.

In many cases what we are able to piece together represents only part of the whole industry. Our aim is not to arrive at the exact number with absolute certainty, but to understand the linkages between events, companies and assets and draw conclusions about managing investment risks. This analysis enables us to draw conclusions such as "a 50% decline in oil price will cause a near-term 25% decline in equities and 10-15% decline in US agency bonds". This type of conclusion is counter-intuitive on the surface and cannot be drawn without a system-wide network research.

[1] Here and elsewhere in the text by mapping supply chains we mean identifying the industry clusters, key players in each cluster and the size and value of supplier-client relationships

We use large volumes of data from industry-specific researchers, advisory firms and government agencies. Some of data are estimates, in which case we cross-reference them to make sure they are reliable. All external data sources are listed in the Appendix.

Finally, we interview many industry-insiders, who help us test our hypotheses and fill in the blanks. Most of these individuals prefer to remain anonymous, and therefore they are not mentioned in this report.

INFRASTRUCTURE INVESTMENTS IN CHINA

INTRODUCTION

Investment risk that the Chinese economy poses to the rest of the world is broadly commensurate with growth and prosperity promise and support it provides for its trade partners. Our analysis focuses only on risks of China's hyper growth strategy, without due assessment of the benefits of this strategy in the future in terms of a large, stable and wealthy economy.

LINKS flagged China as a major source of global risk in late 2010, following a thorough analysis of the growth model utilized by majority of Chinese companies. This year we have updated our China research with a detailed mapping of over 300 companies, banks, local government finance vehicles (LGFVs), municipalities and most involved global banks, with their business relationships and cross-dependencies.

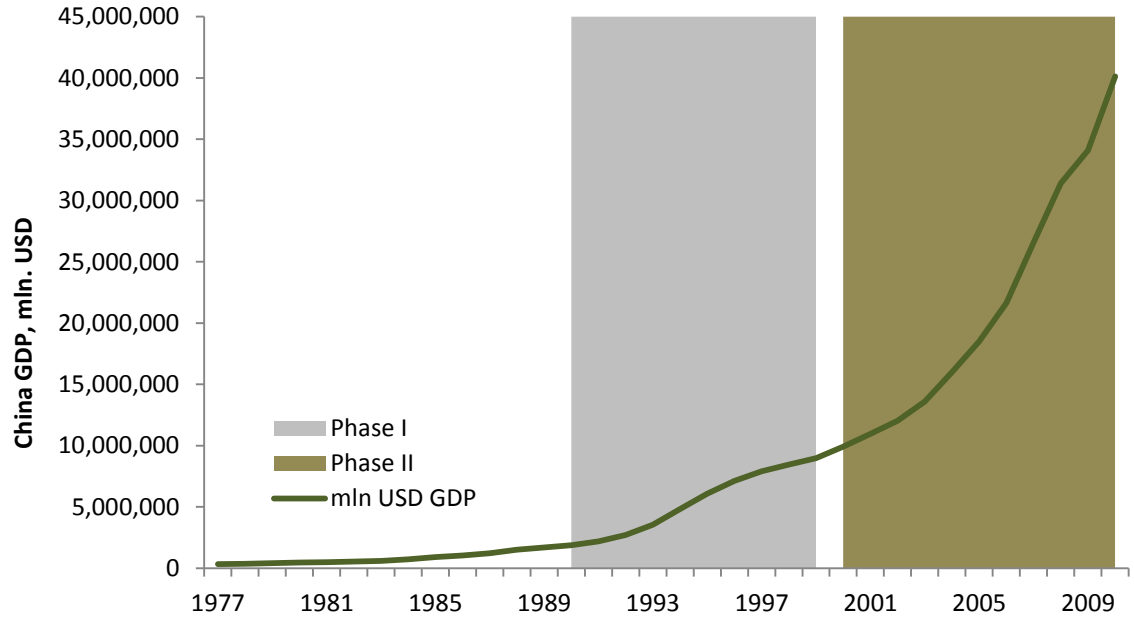
We have carried out thorough analysis and cross-referenced all publicly available data from PBOC, special government audits, Chinese National Bureau of Statistics, LGFV prospectuses, annual interim and quarterly reports filed by Chinese banks on various exchanges. Although data quality and consistency, as always, are suspect in China, we believe that cross-referencing of various sources and plausible indirect evidence have enabled us to piece together the web of key Chinese and global parties affected by this source of risk.

It is also important to bear in mind that supply chains in China are far more intermediated than global/western supply chains, which means that our earlier remark on certain simplification of business networks has even greater bearing on the Chinese companies. While this means that the overall potential loss may be underestimated, general cause-impact analysis is intact, particularly for global portfolios.

GROWTH MODEL AS A SOURCE OF RISK

We break down the exponential growth of the Chinese economy in recent past into two phases. In phase I in the 1990s and early 2000s, the growth engine of the economy was booming exports, while in Phase II the engine slowly shifted to domestic infrastructure spending (Figure 3). Risks that China and the rest of the world face at present can be directly attributed to these two phases and the accumulated global imbalances in these periods.

Figure 3: The two phases of GDP growth in China

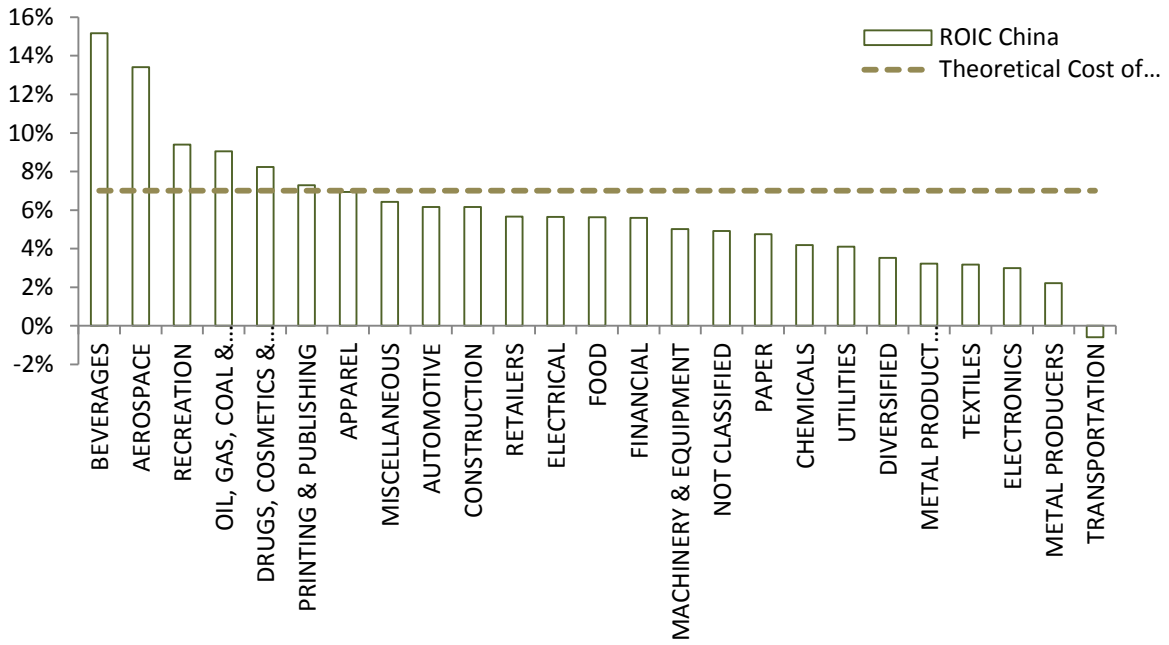


In our earlier coverage of risks posed by the Chinese economy we concentrated on the excesses generated by Phase I growth model. Since we believe that some of these excesses still pose additional risks, a brief summary of these findings follows.

Growth in Phase I was driven by export-oriented state-owned enterprises geared towards generating high revenues at extremely low margins. Capacity utilization in this model is the key, since it provides the ultimate goal of full employment. The resulting asset base is tied in low-margin low-return industries, with all but four major industry sectors generating economic losses for over a decade (Figure 4).

Figure 4: Return on Capital Invested (ROIC) in various industries in China and the theoretical cost of capital

Return on Capital Invested by industry has been calculated for public companies listed in mainland China. Theoretical cost of capital is based on market-driven non-regulated interest rates in China.



The analysis carried out above is based on MSCI All Country World index constituents of Chinese companies and includes the largest listed companies that are more profitable than non-listed state-owned companies. The cost of capital here is based on the assessment of open (black) market rates for credit.

Clearly these economic losses[2] should translate into a major problem for the banking system. Most of the capital channelled to state-owned exporters is handled by top state-owned and part privatized Chinese banks. Indeed, by late 1990s Chinese banks did accumulate non-performing loans (NPLs) of up to 25-30% of their assets and had to be rescued by the government. NPLs were funnelled to state-owned asset management companies in exchange for bonds/papers issued by the Treasury. This purely accounting exercise meant that the banks went from bankrupt to healthy over-night.

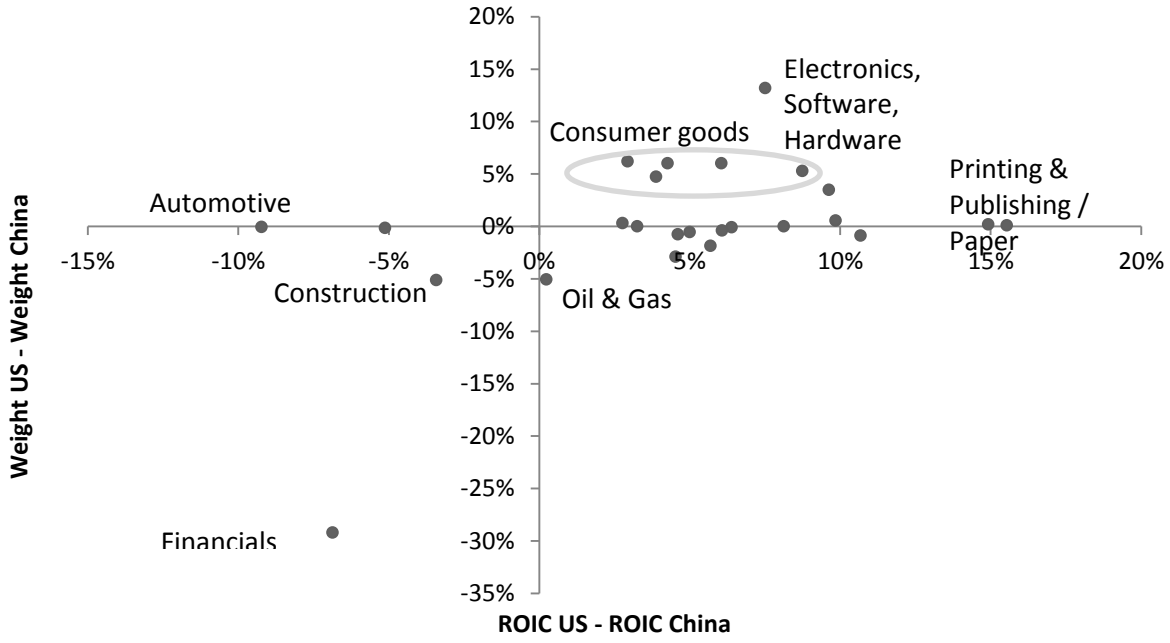
However, the gigantic debt remained in opaque asset management companies who did not publish any reports about the nature, size and the ultimate faith of these assets. Very little of this debt was actually recoverable[3], so the government had only one way out of the situation – to outgrow the debt. Banks attracted new capital (including foreign) and continued the same cycle of high-revenue/low-return export funding.

[2] Please note that economic losses are different from book losses (Net Income or Earnings). Economic profit assumes that a company earns sufficient profit to compensate for all similar alternative capital uses. Chinese companies have access to subsidized capital, so they do not have to earn the true cost of capital.
[3] Estimates vary between 10% and 25% by Goldman Sachs, Societe Generale and other participants in the market

Once again, it was inevitable that continuation of the same process would generate system-wide losses. Such losses were indeed accumulated, but they did not show up on banks' balance sheets as NPLs. Losses showed up as various financial investments (special low-yielding Treasury papers for sale or for long-term holding, policy bank papers). The resulting industry landscape is based on a large base of industries that are loss-making on economic basis and over-sized banks, with significant part of their assets tied up in "system" exposure – a legacy of decades of suboptimal lending.

Figure 5: Industry size and profitability in the US and China

The horizontal axis is the difference between ROIC in US and Chinese industries. Most US industries have significantly higher return, which in theory makes them more competitive and able to grow faster. The vertical axis shows the difference in index weight between the US and Chinese industries. Economic losses accumulated in most industries in China such as electronics, hardware and consumer goods is subsidized by bloated balance sheets of the financial system.



Industries that are traditionally perceived as strong in China, such as Electronics, consumer goods, textile experience 5% to 10% lower returns on invested capital (ROIC) compared to the same industries in the US (Figure 5). System-wide non-realized losses result in bloated balance sheets of banks; the weight of banks in MSCI China is 30% higher than the weight of banks in MSCI US.

A macroeconomic confirmation of this thesis is the fact that China, with its 60% of GDP investment in capital assets, generates "only" 8-9% growth[4]. Firstly, there have been few countries in recorded history with such a high level of investment to GDP ratio, and secondly, at such a level of investment a country with "profitable" investments can generate growth of close to 15%.

[4] The actual growth is lower if losses on loans are realized regularly.

The exact extent of the Phase I legacy is hard to prove, but we estimate that 15-20% of the balance sheets of the banks are there in order to, one way or another, cover the accumulated losses. Note, that given the accounting and auditing practices in China, such "reserves" could be held as new loans, bonds or any other type of financial assets. Also, given the single shareholder (see the China Risk Network) and centrally directed governance of the banks, these losses may migrate between the banks in the form of inter-bank lending.

Phase II of Chinese growth model was kick-started in mid-2000s and accelerated in 2008. It is hard to overestimate the scale of collapse of the Chinese companies, if it weren't for the escalation of Phase II. Typical western companies have a margin and asset buffers that protect them against cyclical downturns. Chinese companies were already operating at razor-thin margins and had accumulated debts. The simple solution was to print money and start large-scale infrastructure projects.

Total Social Financing, a term describing credit creation for largely infrastructure spending, has risen sharply since 2008 to reach 40% of GDP in the past three years. A large part of this spending was carried out by local governments. Since local governments were not allowed to borrow directly from banks, special purpose vehicles – Local Government Financing Vehicles (LGFVs) were set up to channel funding from banks to local infrastructure projects.

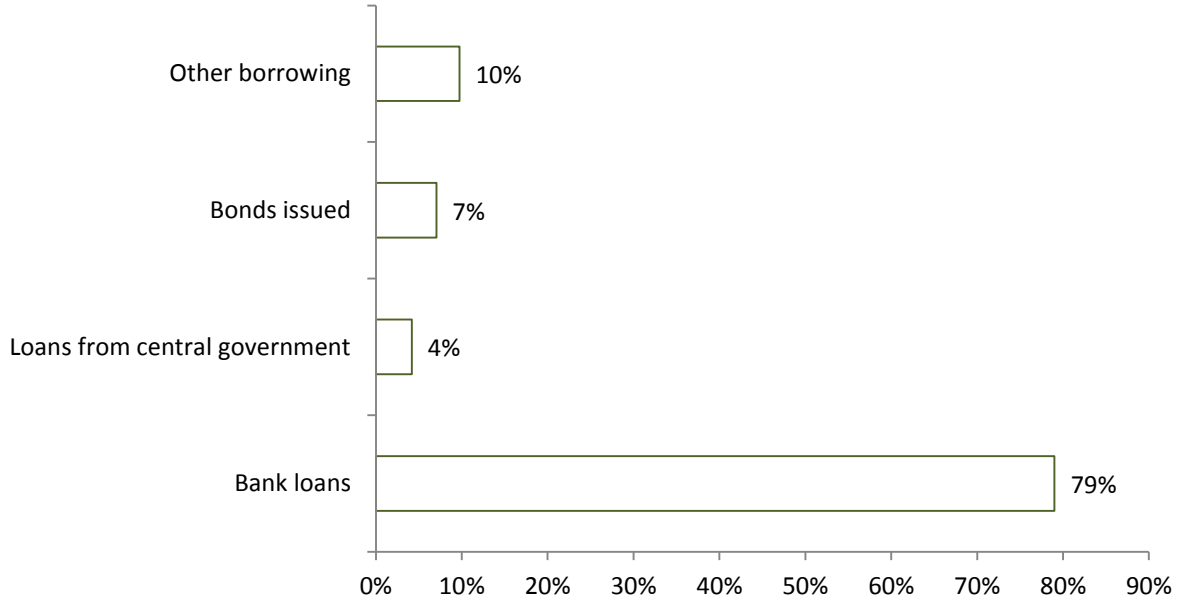
In a typical transaction, a local government (e.g. municipality of Ningbo) sets up a vehicle (Ningbo Urban Construction Investment Holding Co), which attracts loans from banks and places bonds in the financial markets to be spent on city-specific development projects. As part of this transaction, the city "sells" land for the project to the property developer. This land sales revenue contributes on the average 80% of local government budget and is essential to its continued operation.

Unfortunately, the glut of funds was spent on infrastructure assets based on the same mechanism as the phase I state-run enterprise funding, i.e. government directed funding. According to various leaked and then denied government (PBOC and Bureau of Statistics) estimates, up to between 20% and 80% of these projects have no or little intrinsic cash generation capacity by design, i.e. toll-free highways, promenades, culture palaces etc. No surprise then that up to 80% of this funding is deemed non-performing, which incidentally is the same rate as the NPLs in Phase I of China's growth model.

THE SIZE OF THE PROBLEM

Discrepancies in numbers are widespread. Even different government sources disagree, with PBOC estimating the size of LGFV debt at USD 2.2 trillion, while the National Audit sets the same number at USD 1.7 trillion. Both numbers fail to reconcile with the bottom-up estimates. Bloomberg News carried out a review of all (only) public debt issued by 231 LGFVs who published prospectuses and put the total amount of debt issued in one year at $ 622 billion, or 36% of total debt stock as estimated by the National Audit. According to the same report, the number of LGFVs is 6576 and the public bond part of all debt is only 7% (Figure 6).

Figure 6: Structure of LGFV debt by the source of funding



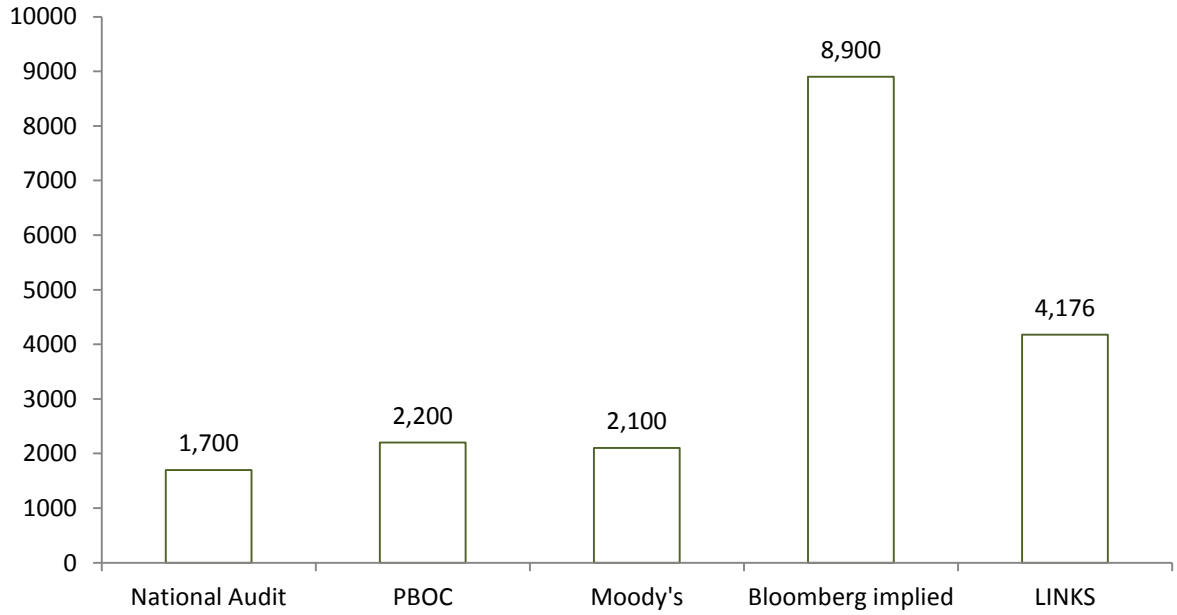
Source: National Audit Office

The report sheds light on the quality of assets: "...1033 such companies have problems such as false-financing, the registered capital being unpaid-in, illegal provision of funds and withdrawing them by local governments and departments...As the investment of debt funds is mainly directed by these companies at projects serving public welfare or quasi-public welfare whose recovery of funds takes a fairly long time, their profit-yielding capabilities are rather weak. A total of 1734, or 26.37% are loss-making companies."

The discrepancies do not end there. According to the episodic disclosure by banks, their exposure to LGFVs is limited to 3-4% of their assets, although if we take the low-end estimate number and take into account that 80% of it is funded by the banks, this yields an exposure of over 25% of bank assets of the larger banks.

Given this much controversy, we have cross-referenced all publicly available sources and come up with our estimate that we believe errs on the conservative side (Figure 7).

Figure 7: Size of LGFV debt



WHY IS THERE SUCH CONTROVERSY?

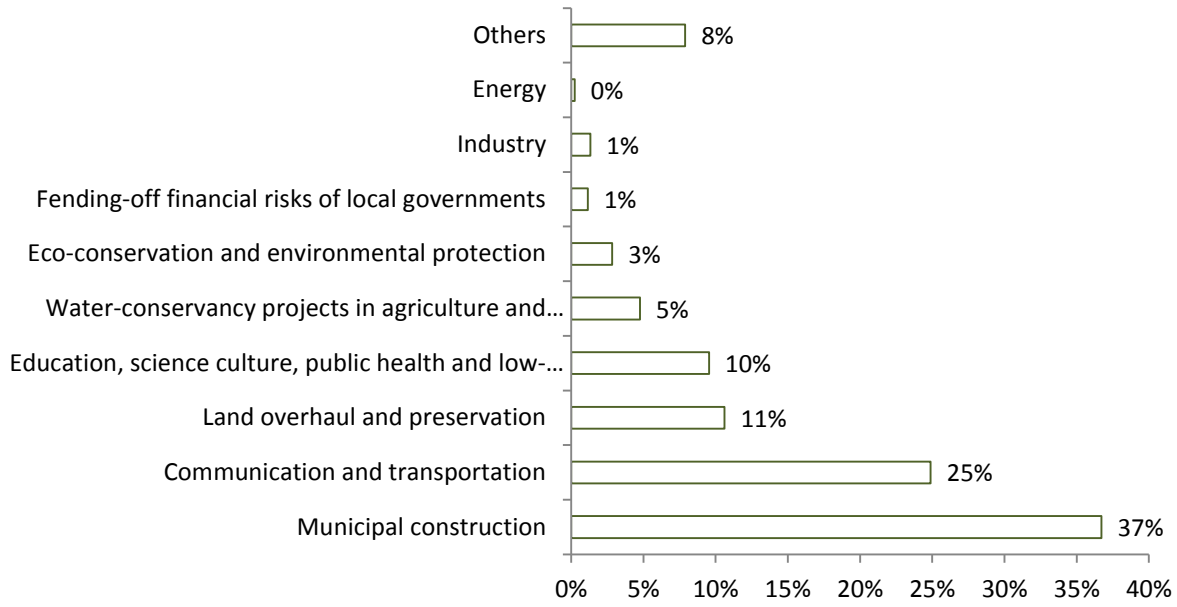
In our assessment, the size of total LGFV debt is $ 4.2 trillion, with nearly 80% of it problematic. To have an indication of the reasons for such a large proportion of poorly performing loans, one needs to carry out a ground-up research. A typical list of such projects from one of the construction companies (Table 1) reveals that a large proportion of the projects was not even meant to be economically feasible, and was social in nature. While we will leave the argument for or against social projects aside, lack of cash generation means that they have to be subsidized. But if majority of projects are social in nature, they give boost to the economy while they are in progress and create dead weight of non-productive assets afterwards.

Table 1: List of major projects, China State Construction Engineering Corp. Ltd.

Project	Value (bln. RMB)
Panjin Zhigao Cultural and Scientific Animation Industrial Park Project	8.0
Xinjiang Jiarun Resources Holdings Ltd, 500KA Projects	3.0
Shanghai Bay Project, Phase Ⅱ, and Yangguang BinjiangCenter Project, Shanghai	2.5
Langfang Urban Infrastructure Financing Project	2.4
Weilong Road Residential Development Project, Taipa, Macau	2.3
Urban Complex Project of Yantian Port, Shenzhen	1.6
Chengdu Western International Financial Center Project	1.5
Urban Complex Project of Mengyang New City, Pengzhou, Sichuan Province	9.1
Hangzhou Expo Center, BT Project	8.3
East Tower of Zhujiang New City, Guangzhou	5.6
Infrastructure Works in Huangling Dajunshan Area, Wuhan City, BT Project	4.5
Liaoning Panjin Oriental Ginza Hotels and Central City Projects	4.3
Innovation Complex Project of Nanjing New City Scientific Park	3.8

Only 1.6% of all funds have been used for industrial and energy-related projects, with over 80% going into municipal construction, transport, land overhaul and preservation and social needs (Figure 8).

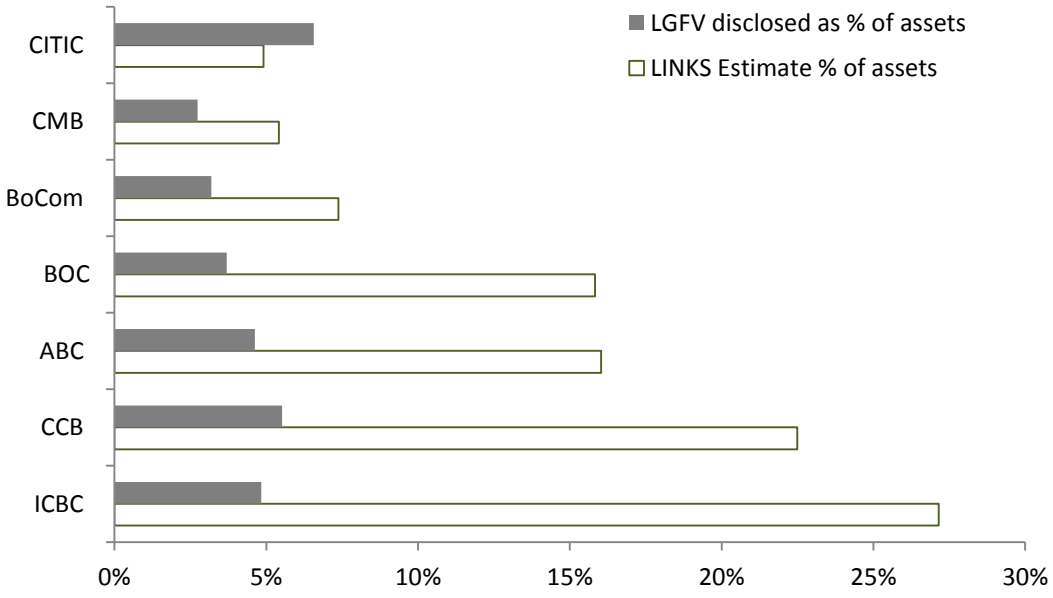
Figure 8: LGFV spending by industry



Source: National Audit Office

Once again, large partly state-owned banks are in the epicentre of this systemic risk, with varying degree of exposure (Figure 9). The combined size of potential system-wide losses could be well in excess of the vast foreign reserves of China's central government.

Figure 9: Bank exposure to LGFV debt



HOW DO THE BANKS SHOW GOOD NUMBERS?

Given the size and complexity of this issue, it is not unusual that the parties involved are less than forthright about the problem. What is more questionable is the market perception about the quality of bank assets. To our knowledge, the level of NPLs and earnings reported by listed banks is hardly ever questioned. All listed banks report higher loan portfolios and falling NPLs in the range of 0.5%-3% of assets. Earnings continue to be stellar – over 20% increases year-on-year.

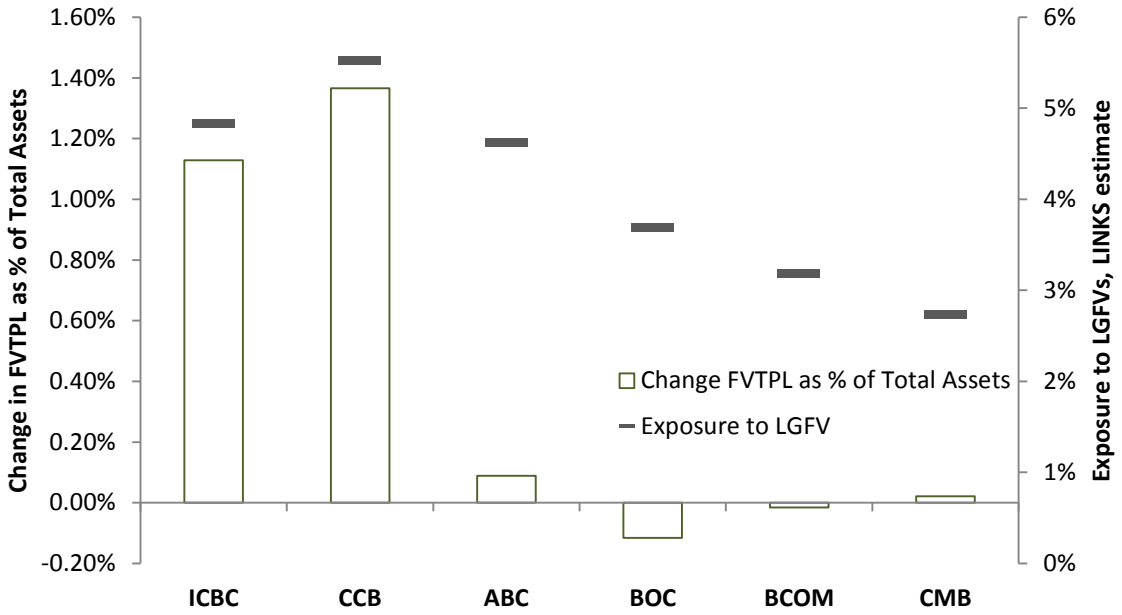
We can only guess how banks keep the appearance of healthy books. A combination of forward rolling, cross-subsidizing and refinancing with bonds is likely to be used in order to avoid booking problematic loans as NPLs. First, many banks have increased the proportion of long-term (over five year) credit last year.

Second, the size of inter-bank loans has increased dramatically. In theory, if state-run banks act in concert, this could be used to hide NPLs indefinitely. In such a setting, when a loan is nearly overdue, a second (friendly) bank issues a loan to the company involved, which covers the debt with the first bank, while the first bank lends the money to the second bank.

Finally, there has been a dramatic increase in assets accounted for at fair value through P&L (FVTPL) last year. This fair value accounting rule is generally used to account for listed financial instruments that are marked-to-market. However, over 90% of increase in the Chinese banks has been due to non-listed bonds that technically can be marked-to-marked as one pleases, since there is no market. Not surprisingly, banks that have disclosed higher exposure to LGFVs have reported greater use of FVTPL accounting (Figure 10).

Figure 10: Exposure to LGFVs and fair value accounting

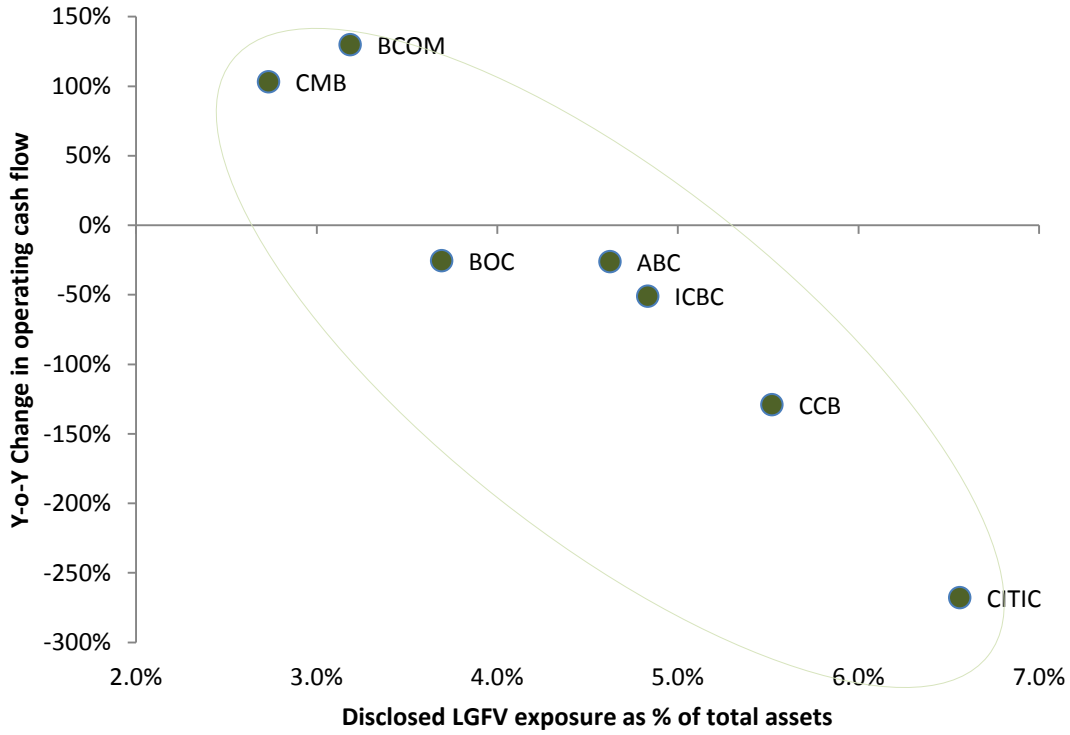
Banks with greater exposure to LGFVs could have refinanced failing loans with non-listed bonds that were then accounted for using fair-value accounting.



Whatever the technique used by the banks, it is clear that the financial health of the banks is deteriorating in proportion to their disclosed exposure to LGFV's. A metric that cannot be manipulated easily is the actual operating cash flow in the banks. The plot of the y-o-y change in operating cash inflows/outflows and exposure to LGFVs suggest that cash is deteriorating fast in banks with large exposure (Figure 11).

Figure 11: Change in operating cash flow and exposure to LGFVs

Banks with greater exposure to LGFVs have experienced a significant fall in operating cash flow in the past 4 quarters, although all mentioned banks reported stellar profit growth and low NPLs.

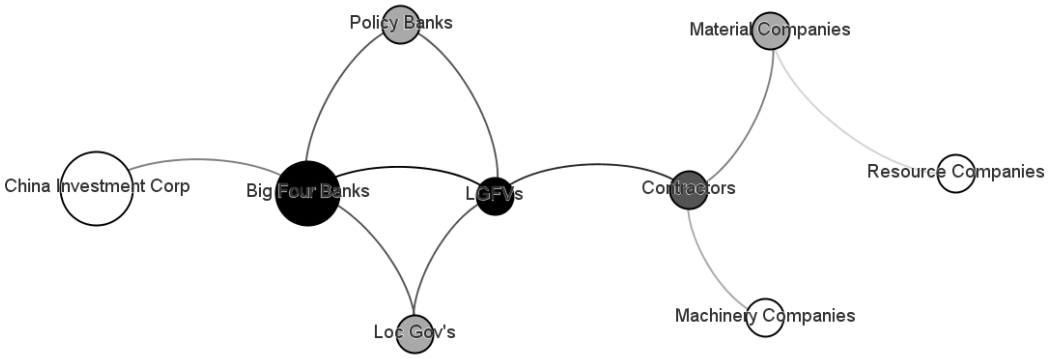


THE TRANSMISSION MECHANISM

Chinese infrastructure spending has been a major source of revenues and even greater source of growth for many global companies. A simplified transmission mechanism indicates, unsurprisingly, that banks and LGFVs are at the core of the risk source (Figure 12). An important feature of this network is a single node at the left – China Investment Corporation (CIC), or more precisely, Central Huijin Investment Ltd. – a holding vehicle for the state-owned banks, which in turn is fully owned by CIC.

Figure 12 also highlights the network impact on global resource and machinery companies such as BHP Billiton, Rio Tinto and Caterpillar. Global infrastructure contractors are less involved, since prime contracting in China is typically handled by a Chinese contractor or the LGFV itself.

Figure 12: Infrastructure spending in China - a network diagram of parties involved and their relationships

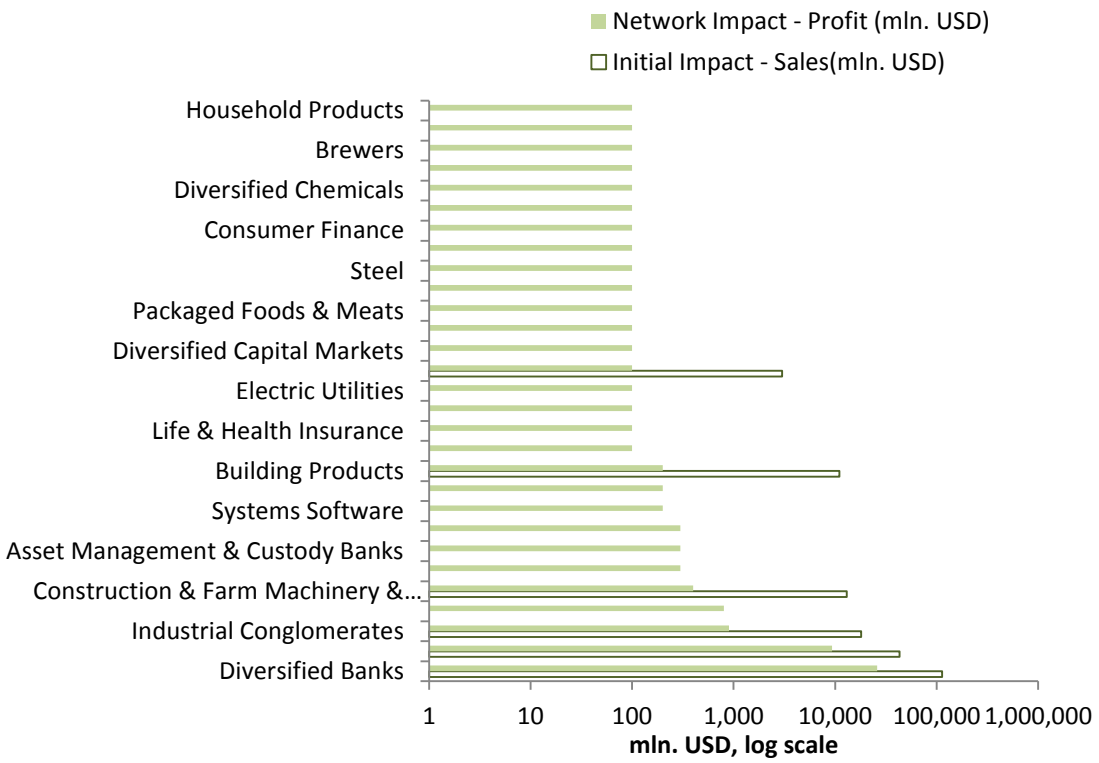


IMPACT ANALYSIS

We have mapped a network of over 300 companies, banks, LGFVs and municipalities. Figure 12 is a schematic rendering of the network. The actual network can be accessed on LINKS Risk portal - http://portal.linksanalytics.com.

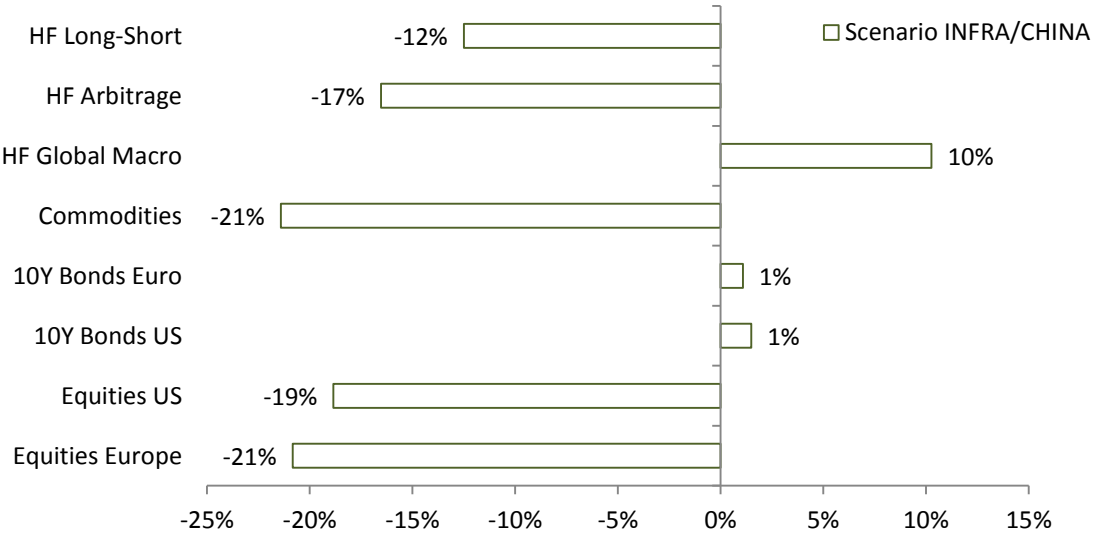
Based on the types of projects and cross-referencing various sources, we have assumed a default rate of 60% of all LGFV debt, which in our opinion is a conservative estimate. This initial impact is passed on through the network to banks, shareholders of the banks, contractors, and eventually to global companies that are part of the LINKS Net. In the second stage, the initial impact on the global companies is simulated in LINKS Net to arrive at the total impact on various global industries (Figure 13) and asset classes (Figure 14).

Figure 13: Likely impact of contagion from the LGFV debt implosion.



Total impact on various asset classes is assessed based on the system-wide impact on equity returns and translation of the resulting ROE's into asset returns (Figure 14). It should be noted though that the total impact on asset returns is based on the overall system-wide risk appetite remaining unchanged. In case of a full contagion, the overall risk appetite will fall and consequently risky asset pricing will "overshoot" our impact estimates.

Figure 14: LGFV contagion impact on asset classes



U.S. AGRICULTURE

INTRODUCTION

The US farmland market in 2011 was not dissimilar to the property exuberance of mid- to late 2000s. Influx of new money and financial investors, record projections and talks of super-cycle, in other words, all standard hallmarks of a bubble are in place. And although experienced farmers do manage to keep a conservative outlook on their business, the crop market, farmland, cattle and feedstock prices are driven by factors that do not depend on the farmers.

Although the absolute value of capital and potential losses due to this risk source are not very high, LINKS assessment indicates that the system-wide impact on asset prices can be higher than for the rest of the 2012 systemic risk sources. This is because the epicentre of the development is the US Midwest, with a large number of US banks, machinery and agribusiness-related firms directly linked to it for a significant proportion of their revenues.

LINKS have examined the structure and constituents of the US agriculture markets, focusing particularly on corn. Since the farm industry in the US is highly fragmented, with over 360,000 individual farms, of which over 16,000 are categorized as large, our network includes three generic farm "groups": small, medium and large. These groups differ in their profitability, yield and the way they will be impacted in case of a correction. Furthermore, over 80 banks and companies directly involved in the US agribusiness have been analyzed and mapped.

Despite the rhetoric about dietary changes in Emerging Markets and growing demand for protein, and food in general driving food prices higher, we have been unable to find any conclusive evidence of this myth. Both China and India, the largest fast-growing emerging markets, are self-sufficient as far as commodity food items are concerned. In fact, China is a corn exporter, while India's key imported food item is sugar. Food consumption is on the rise globally, however, not at a higher rate than the historical norm.

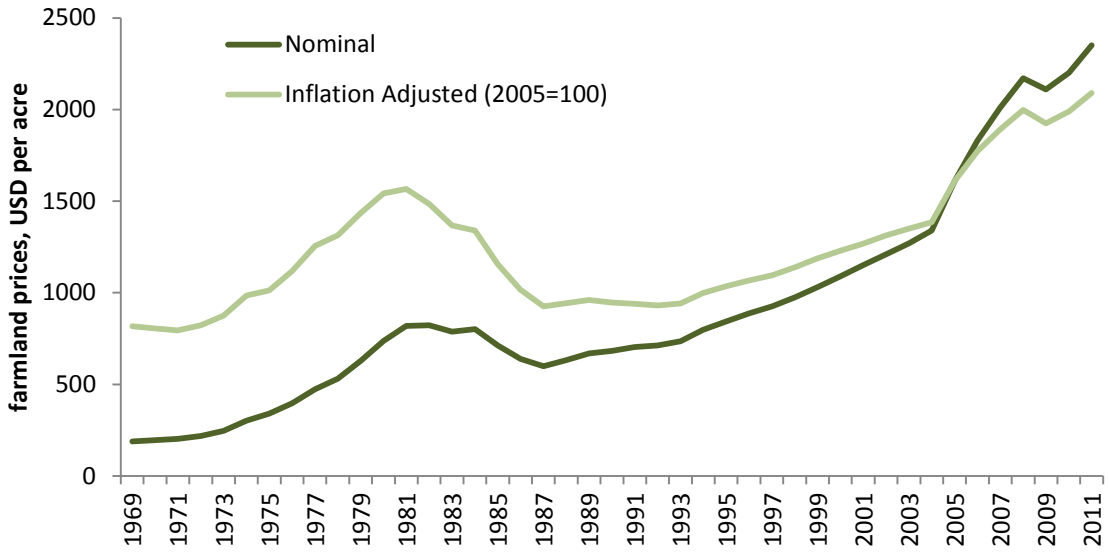
Two key factors helped push farmland and crop prices higher in the US during the last three years: exceptionally high demand for corn driven by the ethanol industry and tight food supply in the early part of 2000s. Our key findings suggest that the US farmland is overvalued by 30% to 80%. Diversified banks, agricultural and regional banks, farm machinery manufacturers, agrichemical and fertilizer companies are set to lose double-digit percentage of revenues if and when a correction in this industry occurs.

THE SOURCE OF RISK

Anecdotal evidence of a bubble in agriculture is abundant in agriculture-related media. The most visible indicator of the bubble, however, is the average farmland prices. Reliable statistics with multiple layers of data on farmland is available from the US Department of Agriculture (USDA).

While residential and commercial property values peaked in the US in 2008 and have struggled since then, farmland prices have reached new highs (Figure 15).

Figure 15: Farmland prices



Source: US Department of Agriculture

Evidence from the industry suggests that the rate of price increase has reached astonishing levels. "One Kansas banker reported that an 80-acre piece of farmland which sold for $3,000 an acre in 2009 had resold for $5,000 an acre – implying a $160,000 profit and a return of 67% in two years"[5]. An interesting remark was made by J. Berg, president of the American Society of Farm Managers and Rural Appraisals, in an interview with DTN Progressive Farmer: "Farmers can batten down the hatches, cut their spending and get by in hard times; if investors have paid $8,000 to $10,000 an acre for land that's not earning a decent return, how long will they hang in there before they move to greener pastures?"

Exceptionally strong farmland prices, in turn, are largely driven by two factors:

- Demand, prices and yields of corn, one of the main grain crops in the US, have been very high due to the developments in the ethanol industry
- Due to the waning confidence in financial assets, private and some institutional investors have been acquiring farmland, which created surplus demand for land.

THE US ETHANOL INDUSTRY

Ethanol, or ethyl alcohol, is a fuel additive used with petrol for internal combustion engines. There are two major standards for ethanol mixed petrol: E15 and E85, with the proportion of ethanol to

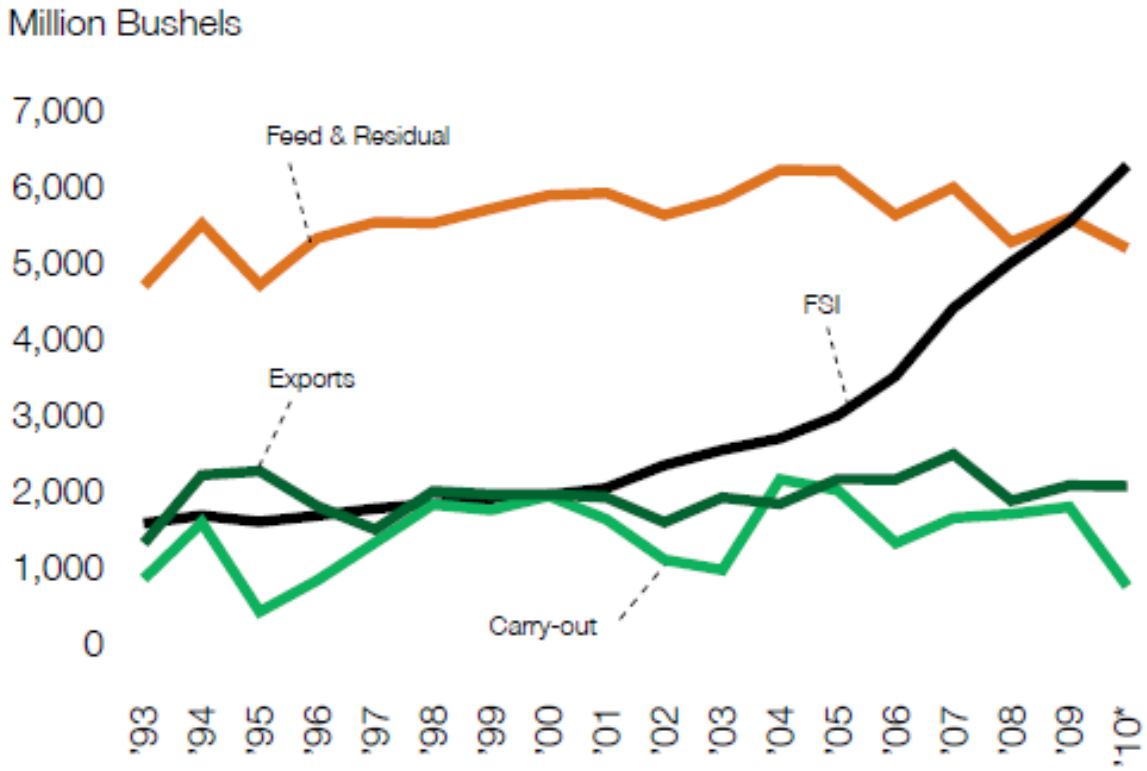
[5] "Farm equipment industry enjoying a banner year", Agrimoney.com

petrol up to 15% and 85% respectively. Although the calorific value of ethanol is lower than that of petrol, ethanol's major attractiveness for the US economy is the ability to produce it from locally grown corn, which means it contributes to the US fuel independence – an important policy goal in the US.

We will refrain from discussing genuine advantages and disadvantages of ethanol as a renewable source of energy, focusing instead on the impact ethanol market has had on farmland and crop pricing in the US.

Following the introduction of USc 51 tax credit for ethanol in 2004 (Volumetric Ethanol Excise Tax Credit, or VEETC), consumption of corn for food, seed and industrial reasons (FSI) as categorized by USDA, has increased from less than 3 billion bushels to over 6 billion bushels, which is fully attributed to the ethanol refineries (Figure 16). Over 40% of total US demand for corn is currently consumed by the ethanol industry.

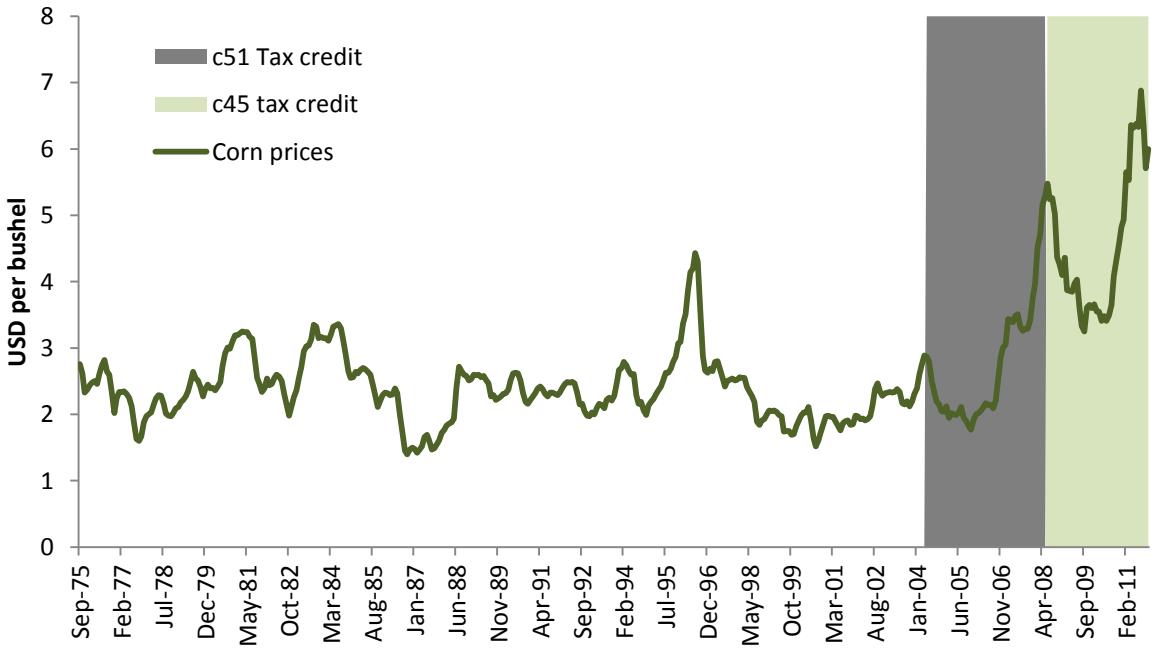
Figure 16: US corn usage by segment, 1993-2010



Source: NCGA, World of Corn 2011

Such an unprecedented increase in demand resulted in higher prices and increased demand for corn, which began to replace and put supply pressure on all the other crops. The level of tax credit was cut to 45 cents in 2008, and finally in the early 2012 the tax credit was scrapped altogether. The lasting impact on prices and capacity, however, was already in place (Figure 17).

Figure 17: Corn price in the US and two tax credit periods



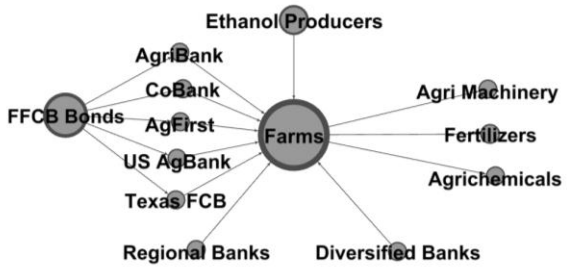
The estimates of net impact of ethanol demand on corn prices vary between 80 cents and $ 1.20. The driving factor behind these increases is the dynamics of ethanol industry compared to the dynamics of corn industry. The new demand for corn, in a relatively limited period of time, had to be accommodated by the farmers. Ethanol had to compete against other uses of corn and other crops. Given the abundance of entrants in the ethanol industry stimulated by accommodating tax regime, shortage of corn was inevitable.

Supply chain landscape is slowly changing, however. Although historically farmer-owned distilleries were a norm, which in a way enabled cross-subsidization of corn with ethanol, more and more distilleries are being acquired by industry leading firms with centralized pricing policy. We believe that this consolidation will be the source of strongest pressure on corn prices.

COMPANIES INVOLVED AND RISK PATHWAYS

Ethanol plants, farms, federal farm credit banks, other agricultural credit banks and agribusiness suppliers in the US are integral parts of the risk transmission mechanism (Figure 18). Combined revenues in this risk network are $ 500 billion, excluding profits from appreciating farmland value. Farmland constitutes up to 80% of total farm assets and its volatile price has a significant impact on the rest of the risk network.

Figure 18: US Agriculture risk network



With the exception of POET[6], most major ethanol plants are increasingly owned and operated by larger companies (Table 2). Archer Daniels, POET and Valero account for over 25% of total ethanol production. This consolidation is likely to have a significant impact on the power balance between buyers and sellers in the corn market.

Table 2: Ethanol plant operators

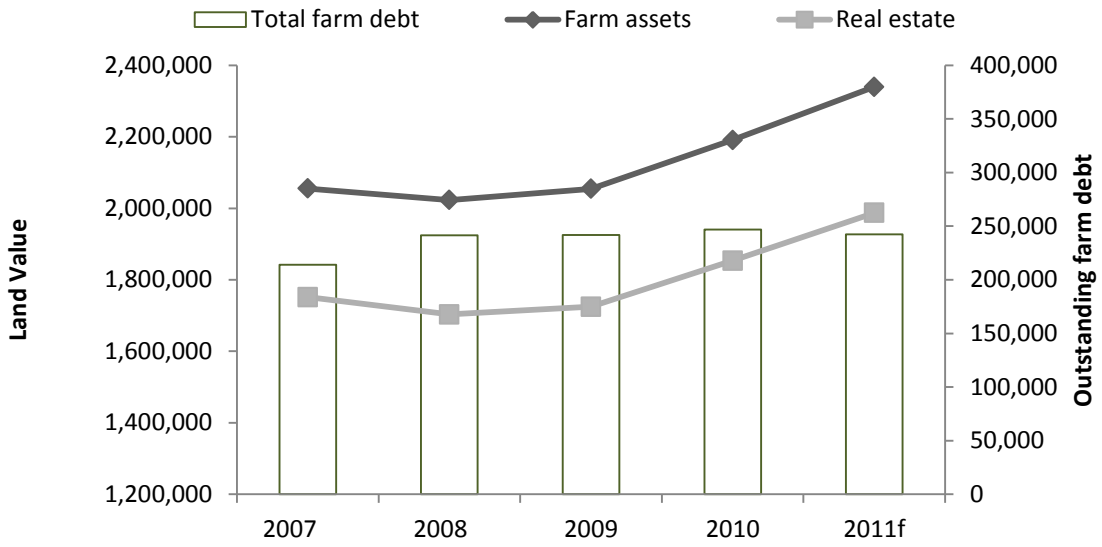
Company	Capacity Mln. gallons year
Archer Daniels Midland Co.	1750
POET	1629
Valero Energy Corp.	1130
Green Plains Renewable Energy	740
Aventine Renewable Energy, LLC	460
Flint Hills Resources LP	440
Abengoa Bioenergy Corp.	378
Big River Resources	350
Glacial Lakes Energy, LLC*	314
The Andersons	275
White Energy	258
BioFuel Energy	230
Cargill, Inc.	230
ABE (Advanced BioEnergy, LLC)	198
Pacific Ethanol	190
Guardian	164
Tharaldson Ethanol	150
Louis Dreyfus Commodities	145

Although it may seem a little counterintuitive, the impact of a potential systemic event on food production is unlikely to be strong, largely because most productive farms are used to the cyclical nature of their industry and have built sufficient buffers. USDA and US Federal Reserve have examined the "bubble" and concluded that since the degree of leverage is historically low, risks in the industry are also low (Figure 9). What they may have overlooked is that while aggregate debt numbers may be low, the most critical question is who holds this debt. Farmers with longer industry experience have greater equity in their land and are actually paying down debt. This means first time entrants and financial investors are actually amassing debt based on higher land values. This means that higher level of debt (higher interest payments) is accumulated on the

[6] Plants operated by POET are not owned by POET, but by outside investors, including farmers.

balance sheets of more vulnerable and less profitable land owners (an equivalent of sub-prime mortgages).

Figure 19: Total farm debt, farm assets and real estate



Source: US Department of Agriculture

Many US diversified and regional banks have amassed large exposure to farmland and working capital lending to farmers (Table 3). Although corn may not be dominant part of this exposure, in principle, the driving factor for potential losses would be farmland return on capital. Lower return on corn will translate into more land available, higher production and lower prices for other crops. Expectation of this will drive the prices of all crops in the same direction.

Table 3: US bank exposure to agriculture

Banks	Bln. USD exposure to agriculture
Wells Fargo & Co.	9.1
BNP Paribas S.A.	3.0
Rabobank	2.6
Bank of America Corp.	2.5
U.S. Bancorp	1.7
Bank of Montreal	1.2
Regions Financial Corp. (New)	0.9
JPMorgan Chase & Co.	0.8
Citigroup Inc.	0.8
KeyCorp	0.7
Fifth Third Bancorp	0.4
PNC Financial Services Group Inc.	0.3
Zions Bancorporation	0.3
SunTrust Banks Inc.	0.2
Huntington Bancshares Inc.	0.2

Fertilizer and agricultural chemicals suppliers as well as machinery suppliers are also part of the network. Companies with highest exposure are Deer & Co. ($ 14.4 bln.), Fiat Industrial ($ 5 bln.), Agrium ($8 bln.) and Monsanto ($6.4 bln). The complete network is available on LINKS Risk Portal.

Finally, abrupt deterioration in farmland pricing may result in a significant change in the industry landscape, large-scale losses in banks and eventually have an impact on safety perception of FFCB agency bonds. These bonds fund farmland purchases and may eventually be hurt through a mechanism similar to Fannie Mae and Freddie Mac bonds in 2008.

REASONS FOR CONCERN

There are a number of triggers that may cause a disruption in the ethanol market. Chiefly among them, is abolishing of ethanol tax subsidies. Potentially low oil prices will also make petrol substitution financially less attractive and will drive ethanol prices down.

A more serious concern is the growing political opposition to ethanol in the US. Once hailed as one of the key solutions to the sustainability problem, ethanol has recently been branded as "crime against humanity", since higher food prices allegedly caused by ethanol demand were instrumental in famines in a number of poor countries. Whether this argument holds water or not, the momentum it has gained in the US is sufficiently strong to drive political action.

It is, however, crucial to point out that the key trigger in the system is consolidation of the ethanol production industry. Industry dynamics and large losses may occur even if ethanol prices do not change. In order to understand this, we had to investigate economics of ethanol business (Table 4). At the current crop yield levels (145 bushels of corn per planted acre) and price of corn ($ 6 per bushel), farms' return on investment is 14%, while ethanol manufacturing margins are negative.

No wonder then, ethanol firms are consolidating and may actually have sufficient market impact to drive their feedstock prices lower. A 10% margin for ethanol plants translates into a 50% decline in corn price. After scrapping ethanol tax rebates it is plausible to assume that ethanol prices will in fact fall. This, on balance, cannot be good news for corn prices. However, even if ethanol prices remain at present level, ethanol distillery consolidation is likely to result in falling corn prices. LINKS have examined two distinct cases, with fixed and falling (-25%) ethanol prices. Our risk case assumes a 25% decline in ethanol price.

Table 4: Economics of ethanol business in the US

Item	Ethanol price unchanged	25% lower ethanol price
Total cost per acre ($)	538.37	538.37
Yield (bushels per planted acre)	145	145
Price per bushel	6	6
Price per acre of land	2350	2350
Current yield	14%	14%
Current ethanol price (per gallon)	2.121	2.121
Ethanol price decrease	0%	25%
Price after drop	2.121	1.59075
Ethanol fixed costs	0.21	0.21
Other variable and energy costs	0.3	0.3
Profit margin	10%	10%
Implied profit margin of ethanol maker	4.71%	6.29%
Implied cost of corn	1.51	0.98
Current price of corn	6	6
Bushels of corn used in a gallon	0.36	0.36
Implied price of corn	4.23	2.75
New yield	3%	-6%

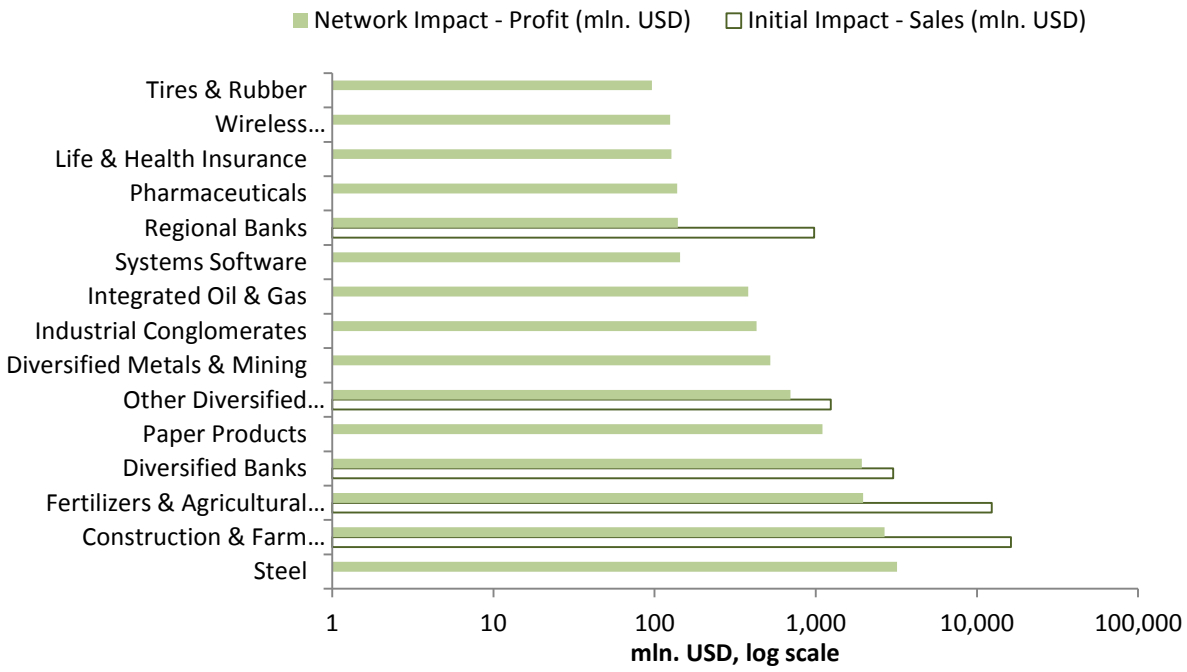
IMPACT ANALYSIS

Despite the relatively small numbers involved, this risk source has potentially a significant impact on a number of global asset classes. First, the epicentre of the risk source is very close to the global industrial supply chains and financial companies. Second, if this risk source materializes, it will impact one of the two key pillars of growth in the US – the largest economy and constituent part of the global equity indices. Third, US agency bonds will be directly impacted by a weakness in farmland prices, which will be a transmission mechanism to the broader financial system. Finally, one of the triggers for such an impact would be lower oil prices, which could be caused by much weaker growth expectations. This means that the US agriculture as a source of risk is cyclical in nature.

The total direct impact of lower corn and farmland prices has been estimated on farm machinery and agricultural chemicals/fertilizer suppliers. We have estimated the loan book impact on banks based on the proportion and tenure of the most recent agricultural land and working capital loans. The impact on the broader economy and all the other sectors has been estimated using LINKS Net based on the revenue impact scenario from the first phase.

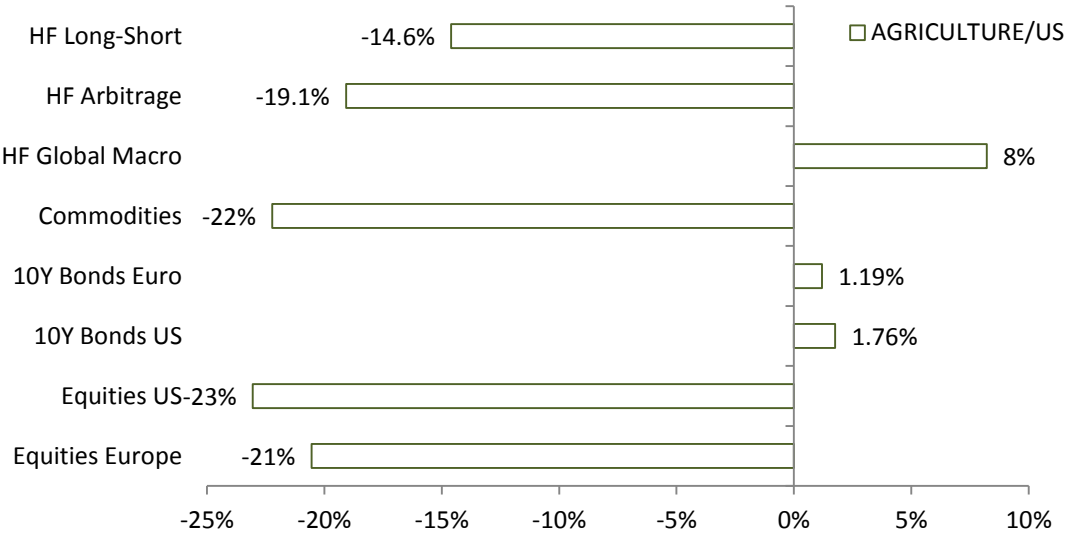
Most impacted industries in the second phase are steel, paper, diversified metals and conglomerates. The general impact is also pronounced in industries with general economic exposure, such as pharmaceuticals, insurance, software (Figure 20).

Figure 20: Agriculture risk contagion impact on industries



The impact on asset classes is quite intuitive, with US equities impacted most, followed by European equities and long-short hedge funds.

Figure 21: Agriculture contagion effect on asset classes



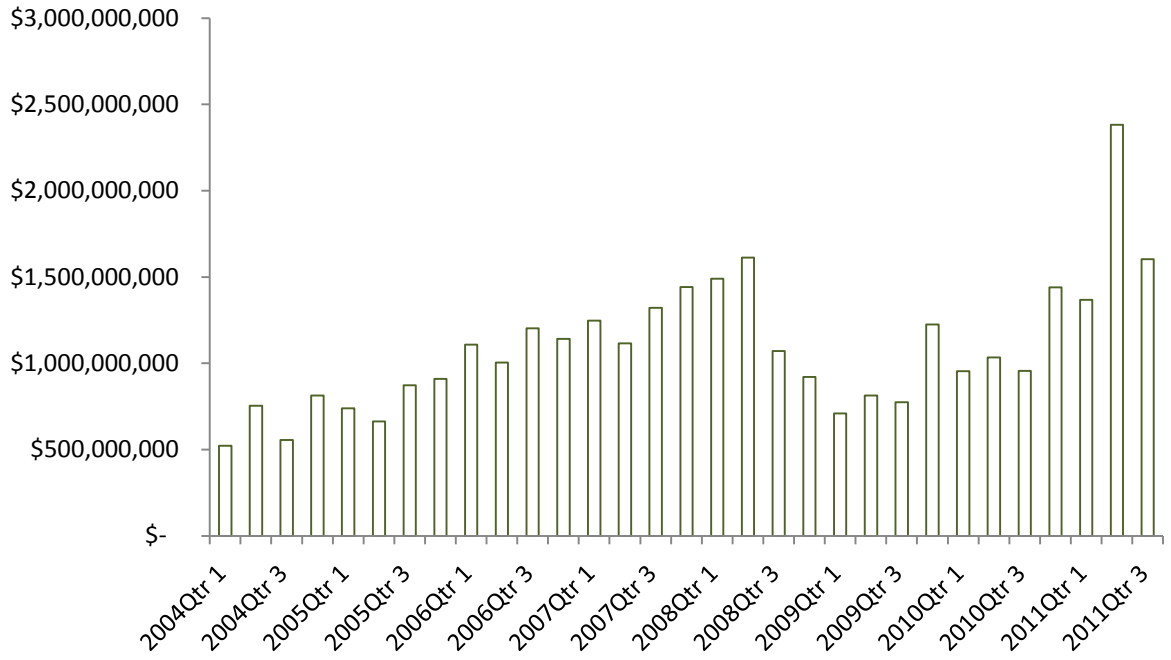
THE U.S. TECHNOLOGY INDUSTRY

INTRODUCTION

Asset bubbles are not new in the US technology sector: most companies, as it appears now, will not even come close to the levels they traded at the height of the technology bubble a decade ago. It is also quite natural to expect a number of asset bubbles materializing and bursting in such a dynamic sector with high returns and low capital intensity. The most recent incarnation of such a bubble, which we will examine in detail, is loosely located in the social networking (SN) and user generated content (UGC) sectors.

Our earlier interest in the US technology sector (specifically internet) was sparked by significantly higher VC funding available for SN/UGC start-ups and follow-on rounds (Figure 22).

Figure 22: Venture capital funding for internet-related ventures in the US.



Although in absolute terms the amount of money is not too high, the increase in funding at a start-up phase usually creates a self-sustaining process, in which the founders of start-ups can show higher valuations in each round by merely attracting more funding at a higher price. This would be fine, if price increases were tied to revenue performance. In SN/UGC world, performance is measured based on the number of users – a familiar metric from the first tech bubble period.

To be clear, there have been a number of successful companies in the sector, which clearly has encouraged the VC industry. Emergence of companies like Facebook and Twitter has demonstrated that returns on these investments can be stellar. The listed part of the Internet market has not

performed poorly either, with revenues increasing rapidly and steady margins for pure online companies (Figures 23 and 24).

Figure 23: Sales and net income, listed internet industry

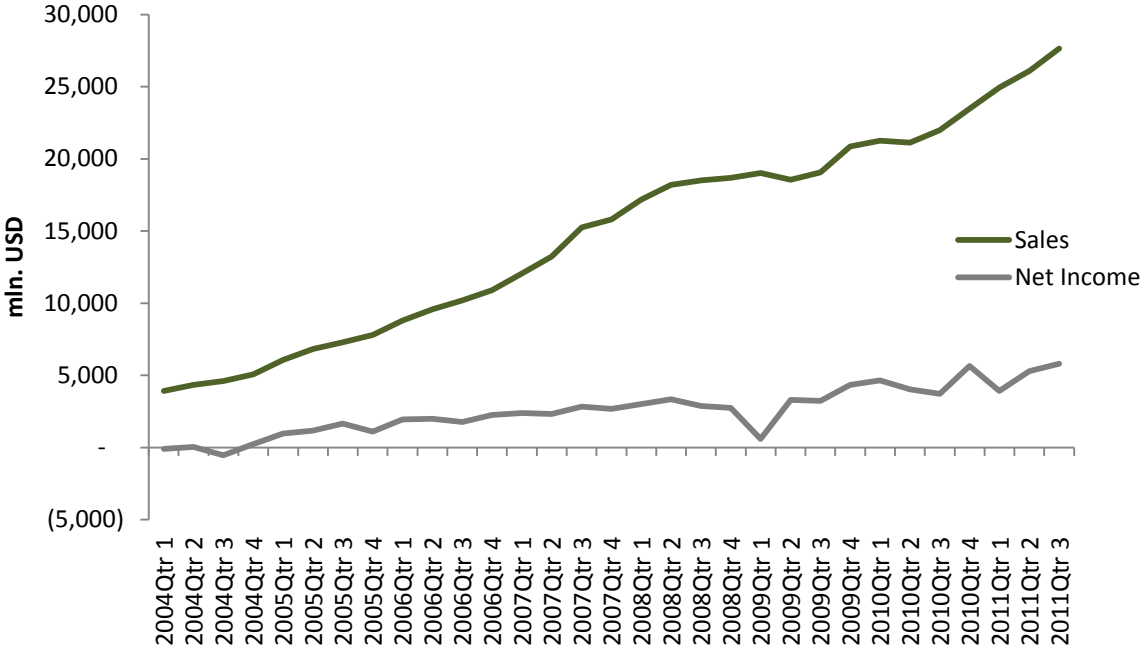
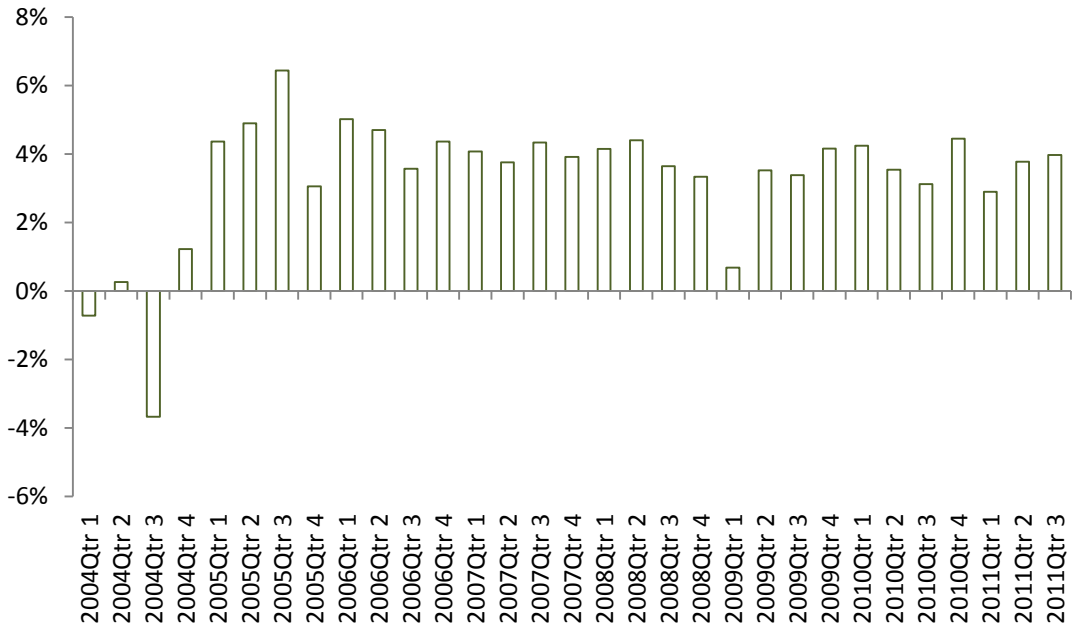


Figure 24: Net margins, listed internet industry



Given these early indications of success, the value of existing companies and capital available for early-stage companies in the SN/UGC sector has increased considerably. Despite the small absolute

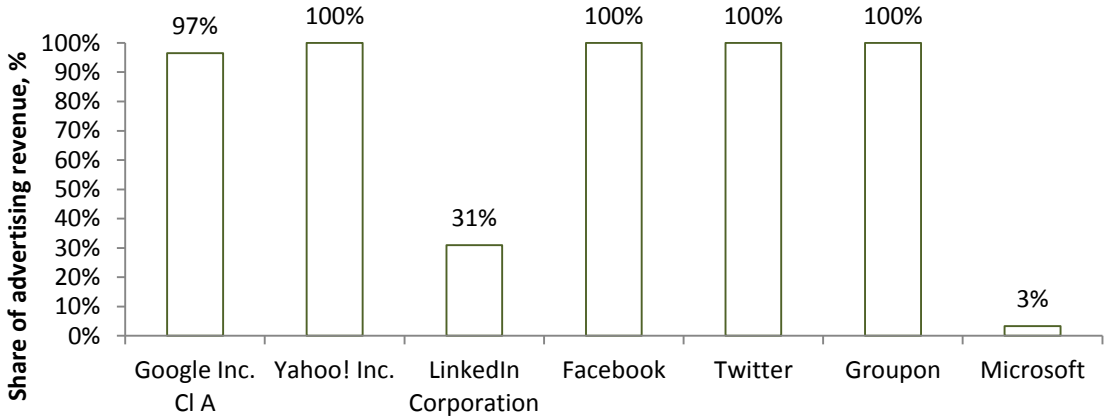
size of "money at work", however, the implications of value reassessment can have a significant impact on investors due to the built-in expectation levels. The expectation-reality gap traces back to the findings that have been apparent at least to the industry observers for a long time: although market capitalizations and implied values of private companies are driven by growth of user numbers, actual revenue models in SN/UGC sector are few and far between.

Our concern about the industry is that first, apart from few exceptions, the key source of revenue for the industry is advertising, second, the shift to online advertising is slowing down, third, emergence of a number of large players such as Facebook, Twitter combined with greater focus of existing companies on the advertising market (Microsoft) will translate into lower pricing and revenues, and finally the current market capitalization of the sector leaves no room for new entrants or lower revenues.

ADVERTISING IS STILL THE MAIN SOURCE OF REVENUE

A great deal of effort has gone into attempting to devise new revenue models for SN/UGC companies with little success so far. Companies like Google, Facebook, Twitter or Yahoo!, despite years of attempts to diversify their revenue, are still almost entirely dependent on advertising revenue (Figure 25).

Figure 25: Share of advertising revenues as % of total, major online companies



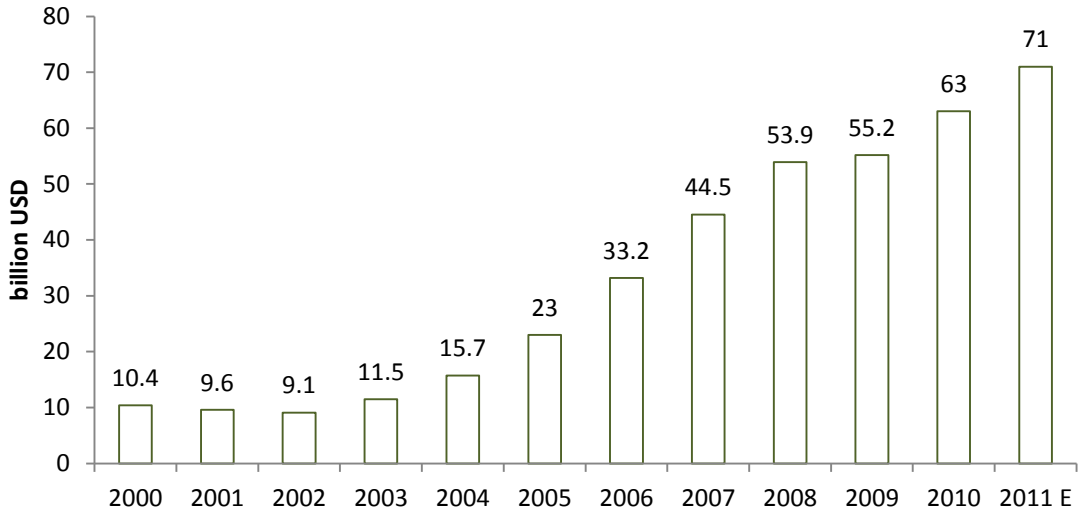
LinkedIn is the only social networking company that was able to diversify its revenue stream considerably by tapping into recruitment – a market that is too small to support more large companies. More recent attempts, such as Groupon's fees for daily offers, can still be considered a form of advertising, since the whole purpose of this service is to attract customers to local businesses.

THE TOTAL SIZE OF ADVERTISING MARKET IS LIMITED

The size of global advertising market is $ 400 billion with 5-8% annual growth, however, large part of this growth is expected to come from China, India, Kazakhstan, Russia and other emerging markets. Most of these countries have formidable local competitors for online ad dollars.

The online share of the advertising market has been increasing steadily, largely at the expense of printed media and radio. The total size of online ad market globally is ca. $ 70 bln (Figure 26), expected (Magna Global) to growing 11% annually through to 2016.

Figure 26: Value of the global online advertising market



Despite the sound level of historic growth rate, there is a natural saturation point for online ad revenue driven by the limitations of the medium. There has been significant effort spent on estimating the effectiveness of Facebook and Twitter advertising compared to traditional media. All outcomes indicate that at best the ROIs (industry-preferred metric) of SN/UGC sites are comparable to traditional media and often below that benchmark.

In our assessment of online advertising market we have remained in line with industry expectations (Table 5), adjusted for a certain market share of local SN companies in emerging markets.

Table 5: Estimation of online ad revenues for the SN/search/UGC industry

	2012	2013	2014	2015	2016
Market size($ million)	78,500	87,000	96,500	106,000	117,500
Share of local companies	5%	7%	12%	15%	20%
Remaining market size	74,575	80,910	84,920	90,100	94,000

LOWER PRICING AND REVENUES

Although the overall market is growing at a healthy pace, the emergence of strong competition is already driving the pricing down. Unfortunately, in an industry that is infinitely scalable, with very limited variable costs (unlike the print media), prices have little or no lower limit.

Clearly, advertising revenue with minor cosmetic changes is the first port of call for most SN/USG companies. Currently, VC-funded companies such as Twitter and Foursquare are developing elaborate plans to monetize their investments with ad dollars. Established companies such as Amazon or Microsoft, form the other end of the spectrum. Microsoft, with its online services (comprising Bing, MSN, adCenter and advertiser tools) has communicated a 25% target revenue share from advertising.

All of this competition, unfortunately, turns into a zero-sum game, as witnessed by Google's fourth quarter 2011 results. While revenues of the search company were high, earnings missed expectations due to an unexpected drop in price per ad click: average price declined 8% in 2011 compared to 2010.

VALUE TIED UP IN THE INDUSTRY

Given the vast array of new technologies, devices, opinions and sentiment relating to social networks, it is often hard to focus on hard facts. We have chosen to reverse the argument: assuming the industry fails to find other sources of revenue, what is the absolute size of the SN/UGC/search industry that the current and expected online advertising revenues can support?

We start with total online advertising revenues forecast to 2016 as in Table 5, followed by a steady growth rate of 6% per annum after 2016. This growth rate is based on the internally consistent growth rate on the back of 40% reinvestment rate and return on capital of 14% (current Google returns)[7].

Low internal growth rates partly reflect the "normal" level of return on investment in the SN/UGC/search industries. These industries are commonly perceived as low capital intensity industries, however, the level of capital intensity is often underestimated because analysts omit the very high R&D capital spend and costs of talent acquisition.

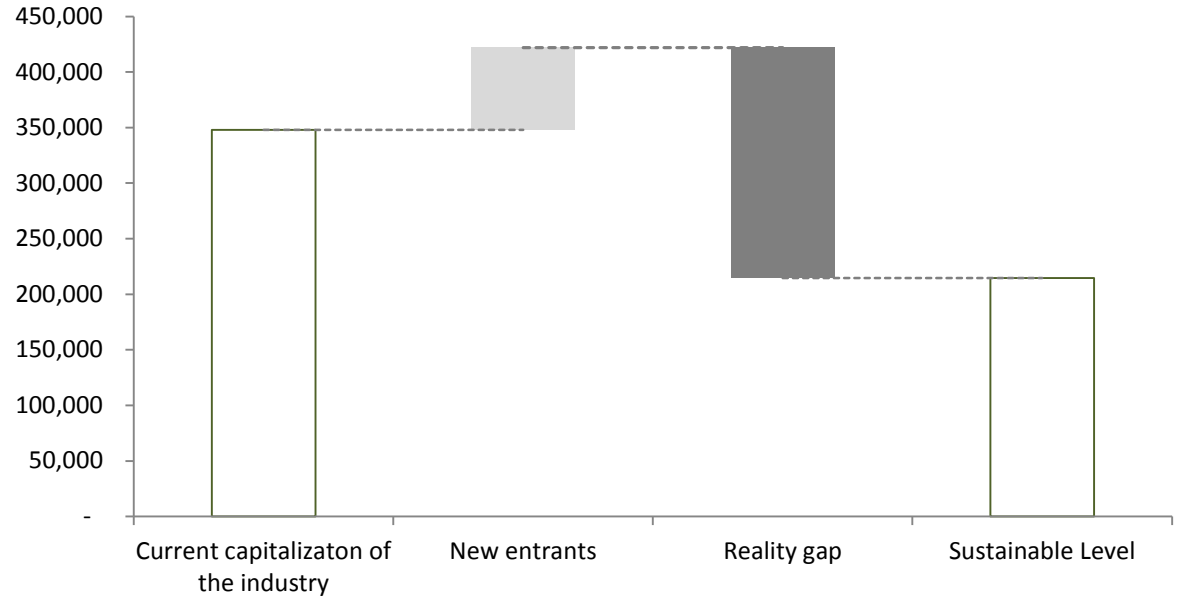
Further assumptions have to be made with respect to the overall risk of the industry in terms of beta. We use a modest 1.3 to reflect a combination of more mature companies and start-ups. The outcome of this enquiry suggests that the capitalization value that the industry can sustain is ca. $ 214 billion, while the combined market capitalization of only top 7 firms is already $ 347 billion. If we had to add the value of all smaller and start-up SN/UGC companies at average series B valuations, the total "reality gap", i.e. the difference between what is real and market valuations is

[7] Internal growth rate is based on G = ROI x RR, where G is growth, ROI is return on investment and RR is the reinvestment rate. This growth rate is the highest level achievable without changing the capital structure.

$ 207 billion (Figure 27). Falling prices for online advertising and greater competition for the same ad dollars are likely to expose this gap.

Figure 27: The reality gap in the technology industry

The sustainable level of market value for the US SN/UGC/search companies is based on the advertising revenue growth expectations. The reality gap of over $ 200 billion is an estimate of the unjustified valuations in this industry.

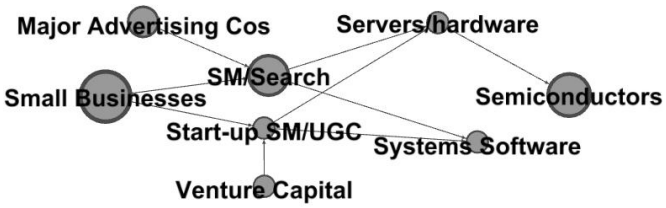


TRANSMISSION PATHWAYS

Given the current state of the industry, an abrupt deterioration of sentiment will have a significant impact on investors, but the broader impact on the asset class returns is unlikely to be material. This is partly due to the same reasons the first technology bubble caused only temporary slowdown in the economy: despite the many ways online technology affects lives of many people, there are surprisingly few real economic linkages between the online social network economy and the real economy.

Clearly SN/UGC markets are major employers in parts of some OECD countries (US West coast, Canada, Ireland), and they do run significant network infrastructure (Google's server infrastructure is likely to be one of the largest in the world), but apart from hardware and system/database software there are little linkages between these companies and the wider economy.

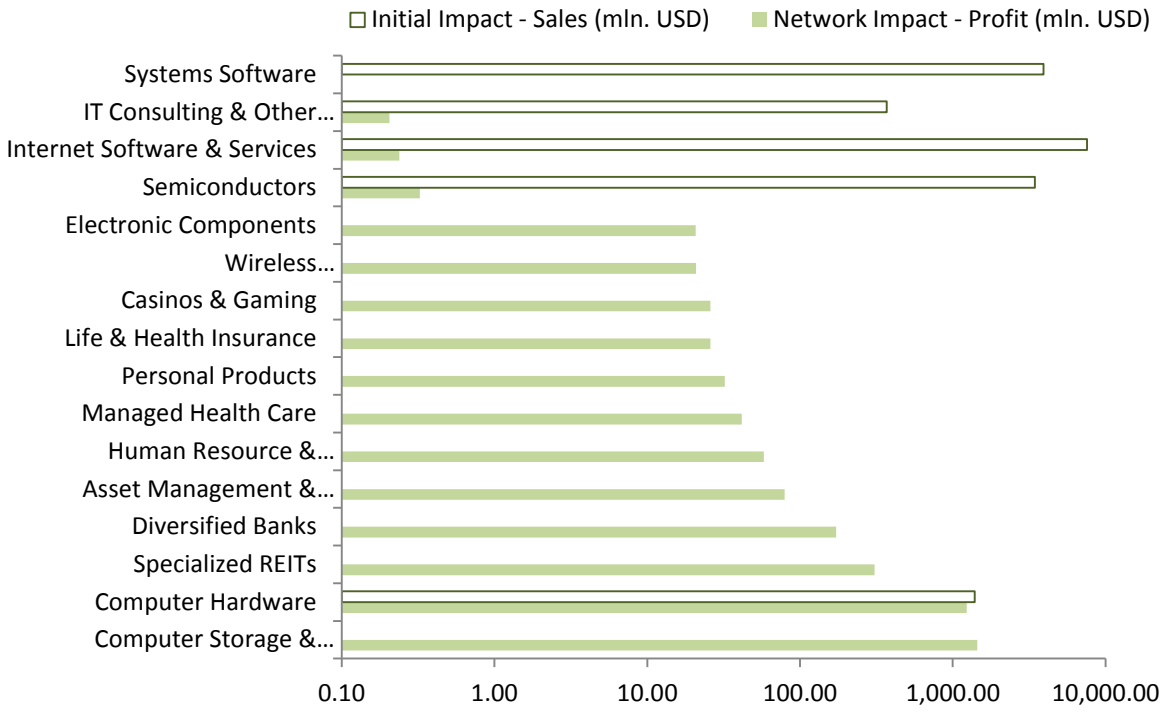
Figure 28: US technology risk network



We have mapped 50 semiconductor, technology hardware and system software companies as part of the SN/search/UGC supply chain. Many of these companies will be directly impacted due to the weakness in the social network economy, with semiconductor companies such as AMD and UMC suffering most from such an event due to the likely lower demand for server infrastructure.

Largest impact is noticeable on computer storage, peripherals and computer hardware industries. Computer hardware is likely to suffer most due to the double impact in the server market and desktop/laptop demand (Figure 29).

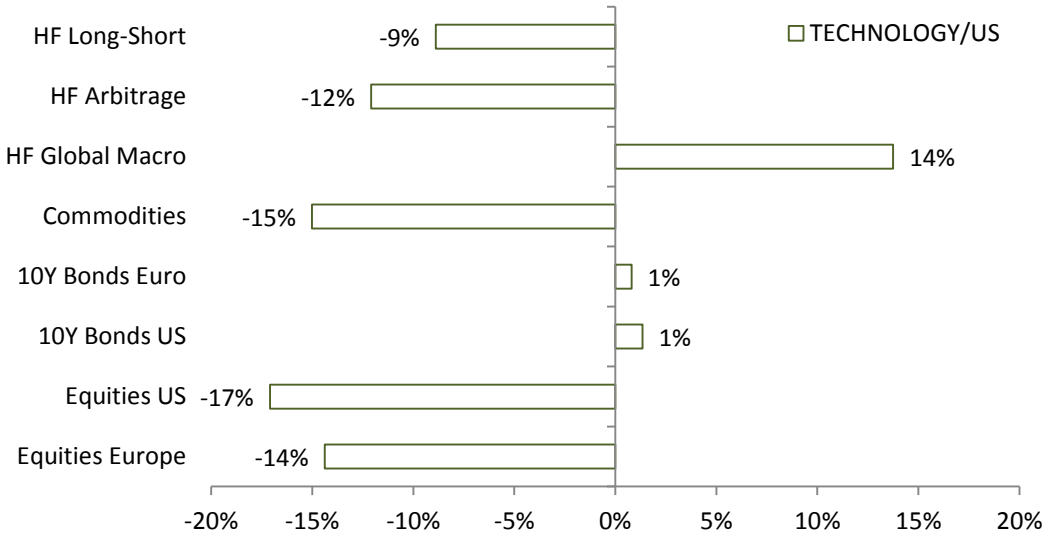
Figure 29: US technology contagion effect on industries



The impact on asset returns is less severe compared to the other major risk sources (Figure 30). However, it should be emphasized that a significant shift in risk aversion may result in greater

losses. Investors having direct exposure to the US technology hardware, global semiconductors, computer hardware and peripherals industries will suffer greater losses.

Figure 30: US Technology contagion effect on asset class returns



THE EMERGING MARKETS AIRLINES

INTRODUCTION

Beginning in 2003, we have witnessed an unprecedented increase in commercial aircraft order rates, with Boeing and Airbus as the main beneficiaries of this trend. The majority of the orders have been placed by airlines from Emerging Markets, most notably Southern Asia and the Middle East. In this analysis we will show that the implied passenger traffic growth rates for these markets far exceed both the fundamentally sustainable growth rate for airlines, as well as the expected growth based on demographical developments. In fact, the extent to which the order rates "overshoot" expected demand is so high that we can refer to the current situation as a "bubble" in the commercial aircraft industry.

ORDER RATES FROM EMERGING MARKETS' AIRLINES ARE UNREALISTIC

Driven by optimistic views on (global) growth, Emerging Markets airlines have placed very sizable aircraft orders from 2003 onwards, in expectation of above-trend growth in passenger traffic. The backdrop of this was a global expansion in all economic sectors and across all regions following the global "dotcom" crisis of 2000 – 2002. Furthermore, most of these orders originate from the Middle East and Southern Asia. These regions were experiencing unprecedented economic growth and increasing affluence of their middle classes. The figures below show the aggregate order rates from Emerging Markets, as well as the breakdown by region.

Figure 31: Orders originating from Emerging Markets, number of aircraft

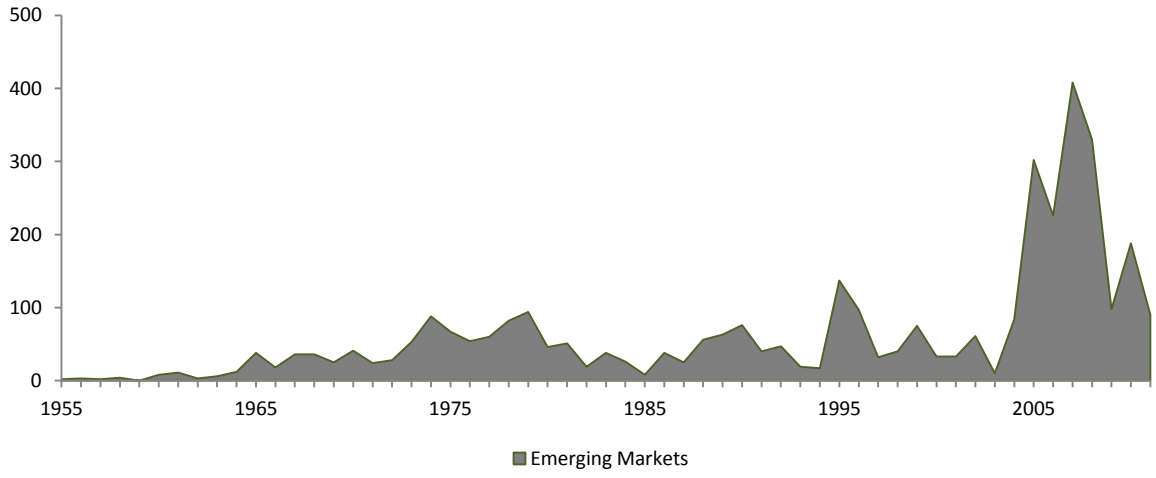
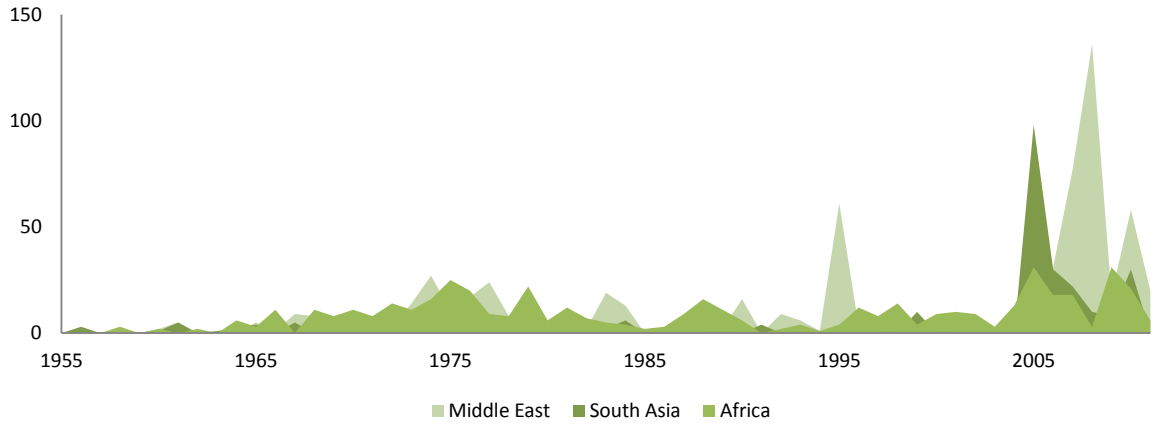


Figure 32: Order by region, number of aircraft



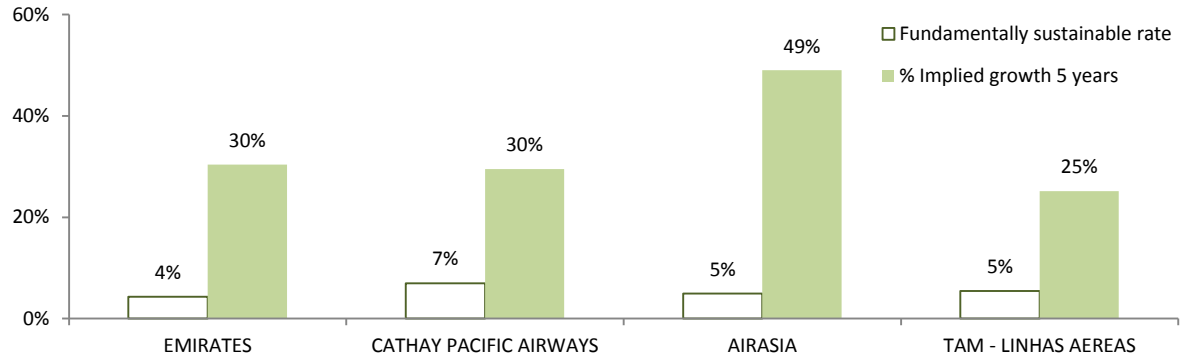
The substantial increase above historical order rates is quite apparent, most notably in the Middle East and, to a lesser extent, Southern Asia.

ORDER RATE IMPLIED GROWTH RATE HARD TO FUND

In principle, airlines place orders for new aircraft with a view of replacing old aircraft and/or expanding capacity in expectation of an increase in demand. Of course, the orders need to be financed through the recurring business of the airlines, otherwise the growth is not deemed sustainable. Although reliable financial information on the airlines that have placed the biggest orders is scarce, it is clear that the fundamentally sustainable rate of growth for these airlines lies in the order of 4% – 7%, based on their Return on Capital Employed (ROCE) and assuming 100% re-investment rate. However, the rate of growth implied by the orders they have placed can exceed 30% on a 5-yr horizon which would clearly be unsustainable, simply because the required investment is a multiple of the current capital base. This is shown in the figure below for a number of selected airlines.

Figure 33: Sustainable and order-implied growth rates by airline

Fundamentally sustainable growth rate is based on funding growth from internal cash flows. Implied growth rates are based on the number of aircraft ordered. The difference must be externally funded with debt, equity or subsidies.



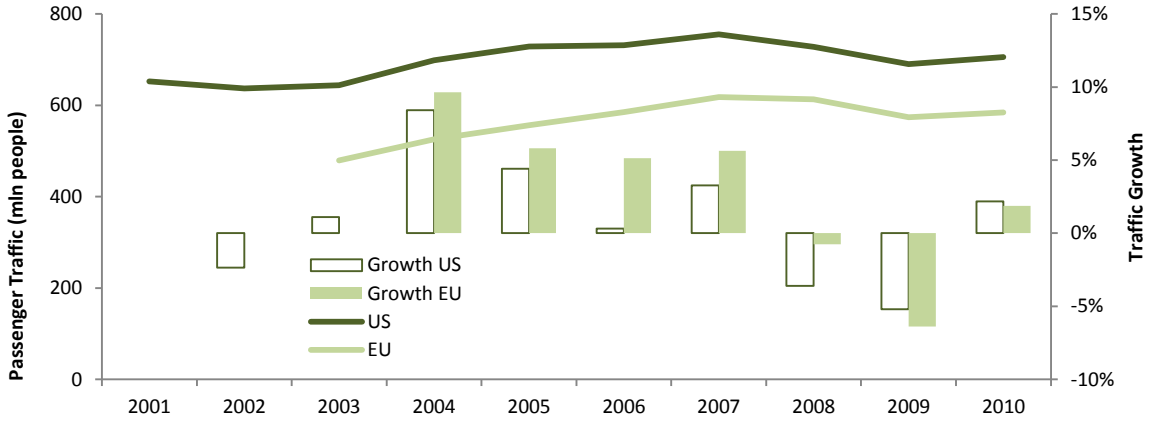
What this means is that, in order to actually take up the aircraft on order without accumulating a large deficit, highly unrealistic growth rates would need to materialize.

HISTORY MAKES IMPLIED EMERGING MARKETS' PASSENGER TRAFFIC GROWTH UNLIKELY

Another crucial assumption underlying the current order book, is that the number of flights taken per capita will indeed increase dramatically in the coming years, in the Emerging Markets customer base. To answer this question we have analyzed the core drivers of number of flights per capita.

GDP growth and existing air travel penetration rates seem to be the most important determining factors when trying to explain growth in actual flights per capita. In this context, we can observe that the optimistic expectations of Emerging Markets' airlines for passenger growth are not supported by historical data on traffic growth. The regions for which we have reliable passenger traffic data have not shown an above-trend growth rate, as can be seen below, even in a period of strong economic expansion.

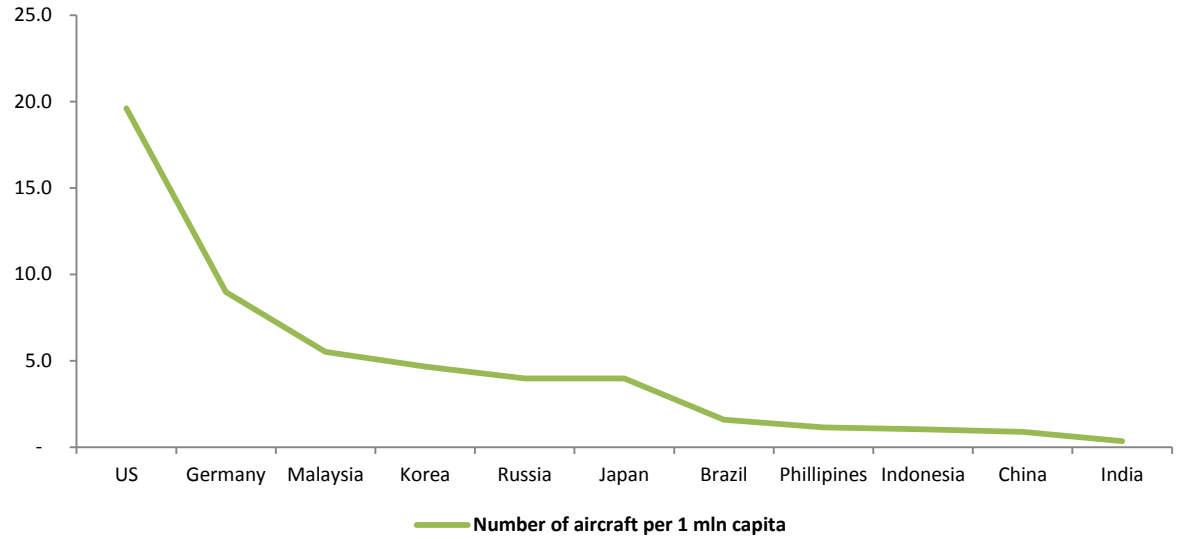
Figure 34: Traffic level and growth rate in Europe and the U.S.



Arguably, the US and EU are mature markets and therefore are potentially not comparable to the Emerging Markets that start from a much lower "base-line". This is shown in the figure below, which highlights the number of aircraft per 1 mln. capita for a number of Developed and Emerging Markets.

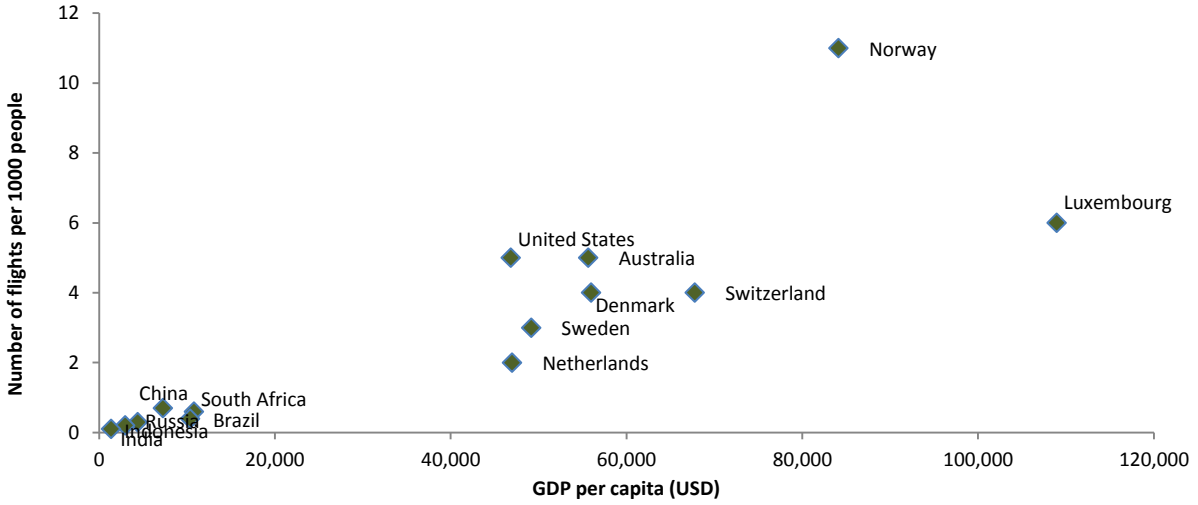
Figure 35: Number of aircraft per 1 million individuals by country

There is a large gap between different countries, only partially explained by income difference.



Moreover, the strong correlation between GDP per capita and number of flights actually taken is offered as an argument that the Emerging Markets will experience strong growth towards the penetration rate of their Developed Markets peers; this correlation is shown below.

Figure 36: GDP per capita and number of flights per 1000 people

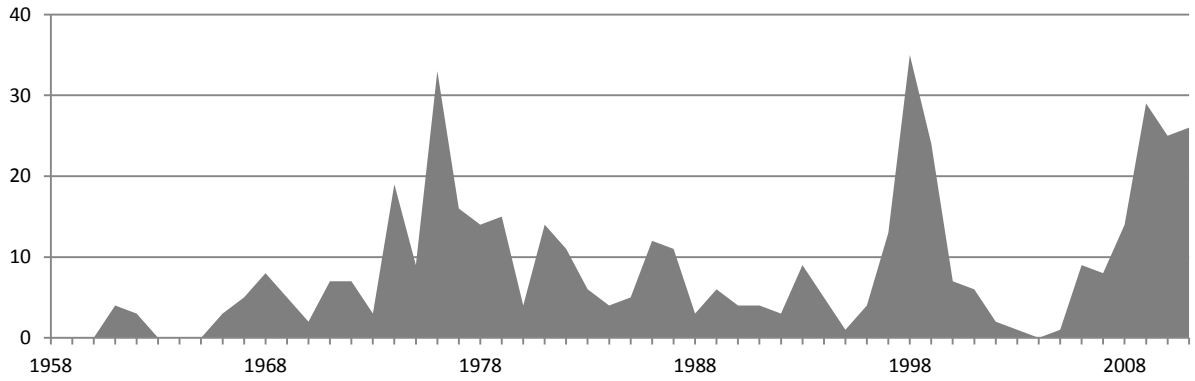


The crucial factor that is overlooked in these typical analyses is the factor of *time*. The analyses shown above contain a very static picture of the situation that individual countries are in. However, before the countries in the Emerging Markets can reach a penetration rate that is similar to that of the Developed Markets, one has to take into account that air traffic penetration typically grows at a factor of actual GDP growth. For non-saturated markets like the Middle East and Southern Asia, this factor is about 1.5 on average but ranges between 0.8 and 2.0. What this means is that year-on-year air travel can only "grow by so much" and closing the gap in air traffic penetration between China/India and the US, for example, will take several decades. Therefore, especially given the highly uncertain and often outright negative view on global growth in general and Emerging Markets in particular, EM airlines' growth assumptions are contentious at best.

ORDER DELIVERIES HAVE NOT COMMENCED, CANCELLATIONS YET TO COME

As is customary in businesses requiring large capital outlays, once an order is placed, this is by no means set in stone. It is possible to cancel an order already placed, usually at a penalty. However, paying the penalty can be far preferable to taking delivery of an expensive aircraft that cannot be utilized to the fullest extent. In this context it is interesting to note that Middle Eastern airlines, who are the biggest customers in the Emerging Markets, have not yet taken actual delivery of the bulk of their orders. This is apparent from Boeing aircraft delivery data, shown below.

Figure 37: Aircraft deliveries to EM airlines



The implication is clearly that orders that have been placed are at risk. History shows that as soon as the negative impact of a stalling economic growth on passenger traffic becomes apparent, orders are cancelled. The current uncertain economic climate will likely lead to that conclusion.

LIMITED ABILITY TO CUT PRICES DUE TO THE GLOBAL COST STRUCTURE

In theory, Manufacturers such as Boeing and Airbus could lower prices in renegotiations in order to save their order book. However, these companies are competing in an industry with a very internationally diversified cost base, most of which is in high-tech products for which both labor and component costs are high. Moreover, higher competition from new (Chinese) manufacturers is already putting downward pressure on prices.

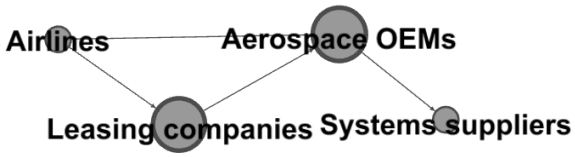
On the airline side, there is not much room for reducing cost structures either. Personnel (pilot) cost is high, fuel cost is both high and volatile. As AMR's recent bankruptcy filing shows, all parties involved are willing to defend their interests at great lengths.

Finally, price increases for end customers in a negative economic climate are only marginally possible. The competition between airlines for fewer and fewer customer dollars typically intensifies during these periods, with many having to operate at a loss whilst focusing entirely on cash flow.

IMPACT AND TRANSMISSION

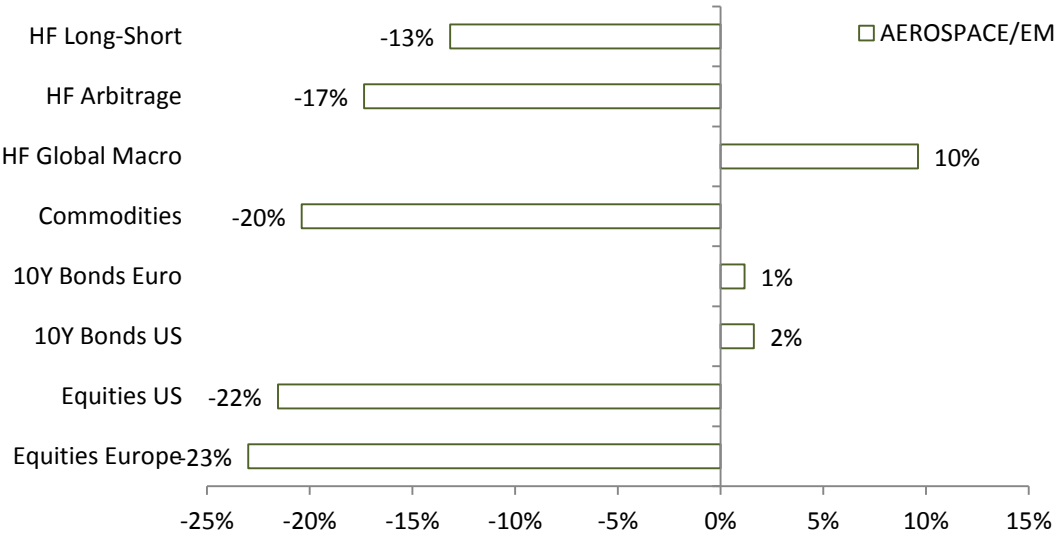
The aerospace network is relatively straightforward, with aerospace original equipment manufacturers (OEMs) and systems suppliers competing in the aircraft market globally (Figure 38). Aircraft leasing companies are responsible for a large part of aircraft financing, with the balance directly owned by the airlines. Direct exposure to these industries will result in significant (over 30%) capital losses. Leasing companies will be impacted even more severely due to the leverage and short-term financing requirements.

Figure 38: Aerospace supply chain network diagram



The impact on the overall asset classes is comparable to the US agriculture, albeit with greater impact in Europe due to the relatively heavy weight of European aerospace/defense companies in the total market capitalization (Figure 39).

Figure 39: EM Aerospace risk contagion effect on asset class returns



APPENDIX: REFERENCE TO DATA SOURCES

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