



18 July 2011

## The Asia Investor Letter

# Tail-Hedging China's (In)Stability Paradox

## Why Californian fire-fighters would make good economic risk managers

**Part I** - China's extraordinary economic transformation following the Deng-inspired reforms of 1978 might be considered equivalent to the Gilded Age in the US, a boom industrialization period of similar length that followed the ravages of the US Civil War. History subsequently showed this to be a springboard for US economic and military hegemony. With per capita GDP in China now approaching that of the US at the onset of World War One, yet still 6-10 times below that of the US today, some observers have suggested favorable base effects for China should ensure many more years, if not decades, of smooth prosperity gains ahead.

Unfortunately we find some problems with a benign extrapolation of the US experience. First, China has generated real per capita GDP growth a staggering six-times faster than that of the US, and with much less volatility than the Asian Tigers, at similar levels of development. But this has been achieved on the back of a doubling in system-wide bank loans in four years, a ratio of credit and fixed asset investment to GDP far in excess of other countries, and a likely understated urbanization rate - all of which raise the question as to how much growth has been pulled forward. The only period where US officials aggressively pulled forward demand and generated Sino-levels of growth (between the Depression and WWII) was followed by a severe recession. In addition, the longer US development period from 1790 to WWI (which catapulted the US ahead of Britain as the world's top manufacturer) was in fact associated with frequent liquidations - GDP fell one in every three years. In contrast to the early-stage US growth experience of repeated 'purge-and-renewal' (which ultimately proved the launchpad for success), there has been no such liquidation cycle in China since reforms began - the 'business cycle' is now into its fourth decade, with the 10yr rolling average on real per capita growth never dipping below 7.7%. Japan's credit and fixed asset bubble in the 1980s generated remarkably similar rates of heady growth with low variability. This brings to mind Minsky's warning on the 'instability of stability'. We worry China's aversion to tolerating a mild rise in unemployment, let alone a full business cycle, may intensify imbalances and continue undermining confidence in the banking system. In short, we are not confident economic alchemy has been discovered, and caution the post-bubble international experience has seen investors apply a significant risk premium on the financial sector in the face of uncertainty. Demographic and affordability challenges in the real estate market also suggest the uncertainty premium could be with us for some time.

**Part II** - In response to growing client interest in hypothetical 'what if' risk scenarios, we conclude with a discussion of cross-asset hedging options. In the search for undemanding breakevens (requiring only a growth scare, not a disaster) and asymmetric payoffs, we are mindful long-protection strategies are not immune to valuation considerations. A few hedges catch our eye. These include H-share puts, Kospi risk reversals and best-of-puts on the HSI, Kospi, ASX and Brazil; in cash equities we continue to expect China financials to de-rate vs. US/Japanese non-financial multinationals; in credit/rates we like receivers in Korea and Australia, payers in China, and CDS on miners; in FX, KRW, AUD, BRL and ZAR appear exposed; and in commodities we suggest a short in base metals vs. gold, agriculture and oil.

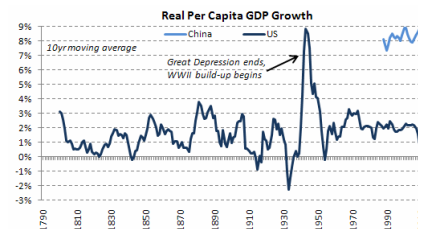
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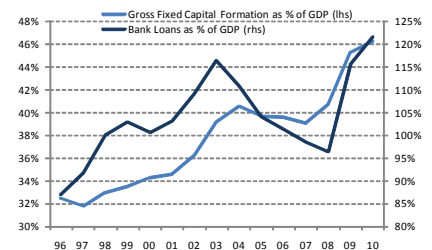
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## Per Capita Growth in China & the US



## Rebalancing?



## Contraction Ahead



# Tail-Risk Hedging China's (In)Stability Paradox<sup>1</sup>

*"I turned to (President Hu Jintao) with a question I liked to ask fellow world leaders, 'What keeps you up at night?'. He quickly replied his biggest concern was creating twenty-five million new jobs a year. I found his answer fascinating. It showed he was worried about the impact of disaffected, unemployed masses."*

– George W. Bush, *Decision Points* (2010, p.427)

## Part I – The (Im)Possibility of Economic Alchemy?

China's post-1978 economic transformation following the Deng-inspired reform and liberalization process is now widely regarded to rank as the fastest and largest mobilization of wealth in human history<sup>2</sup>. The speed of broader socio-economic progress has been no less impressive - China's poverty rate has collapsed from 53% in 1981 to just 2.5%, while the infant mortality rate has fallen 20 percentage points over the past two decades<sup>3</sup>. In this respect, China's metamorphosis over the past three decades might be considered equivalent to the Gilded Age in the US, a boom industrialization period of similar length that followed the ravages of the Civil War and saw US manufacturing output overtake that of Britain. History subsequently showed this to be a springboard for US economic and military hegemony. With per capita GDP in China now approaching that of the US at the onset of World War One, and yet still 6-10 times below that of the US today<sup>4</sup>, some observers have suggested favorable base effects for China should ensure many more years, if not decades, of smooth prosperity gains ahead<sup>5</sup>. The scale of China's rapid ascent is perhaps best illustrated with the colorful opening passage of a discussion of the mainland reform process<sup>6</sup>,

*"The West, its commentariat and investment-bank analysts all saw this as a miracle because they never expected it. After all, 30 years ago China was barely able to pull itself off the floor after the Revolution. Beijing in 1978 was a fully depreciated version of the city in 1949 minus the great city walls, which had all been torn down and turned into workers' shanties and bomb shelters. When the old 'Quotations from Chairman Mao' billboards were painted over in 1979, a new one depicted Chang An Avenue streaming with automobiles: cyclists glanced in passing and pedaled slowly on. Shanghai, the former pearl of the Orient, was frozen in time and completely dilapidated, with no air-conditioning anywhere and people sleeping on the streets in the torrid summer heat. Shenzhen was a rice paddy and Guangzhou a moldering ruin. There was no beer, much less ice-cold beer, available anywhere".*

<sup>1</sup> As we discuss later, the title of this note is motivated by Hyman Minsky's "Instability of Stability" paradox.

<sup>2</sup> There remains some debate around whether the reform process has decelerated or accelerated in the past decade. MIT Professor Huang Yasheng provides an excellent review of these issues in, "Capitalism with Chinese Characteristics" (2008). As an aside, our sense is that the rapprochement between the US and China initiated by the new Nixon administration in 1969, led by Henry Kissinger, around the time of the Sino-Soviet dispute was likely to have been critically important in encouraging China on a new course, though infrequently discussed.

<sup>3</sup> Poverty and infant mortality data are sourced from the World Bank and Unicef respectively.

<sup>4</sup> The IMF estimates China's PPP-based per capita GDP at \$7,520. At market exchange rates, our estimate is \$4,300.

<sup>5</sup> Among others, see for instance, "When China Rules the World", Martin Jacques.

<sup>6</sup> "Red Capitalism" (2011, p.2), by Carl Walter and Fraser J.T. Howie.

As laudable as these achievements have been from a socio-economic perspective, unfortunately however we find some problems with a benign extrapolation of the US experience from an investor standpoint. First, China has generated real per capita GDP growth a staggering six-times faster than that of the US at similar levels of development (Figure 1). And as we come to later, the lack of variability in China's GDP growth (in absolute terms or relative to the Asian Tigers before the 90's crises) has been notable (Figure 2). An inspection of the key contributors to this growth profile - China's extremely high and rising share of both credit and fixed asset investment relative to GDP (Figure 3) – poses the question of how much future Chinese demand has been pulled forward. For instance the total stock of bank loans in China has doubled in just four years, bank loans now exceed FX reserves by \$US4.8 trillion (double the 2008 differential, Figure 4), the ratio of bank credit or M2 to GDP is comfortably higher in China than any other emerging economy<sup>7</sup>, and China's ratio of fixed asset investment to GDP is also now far in excess of that recorded by Japan or the other Asian Tigers at similar stages of development.

The prospect that the official urbanization rate (50%) is understated in China, as suggested by the OECD among others, possibly to the tune of 7-12 percentage points, may exacerbate the infrastructure overshoot (note Japan's Heisei Bubble peaked in 1991 when the urbanization rate was 63% - the upper end of unofficial estimates for China)<sup>8</sup>. On this latter point, it's worth highlighting China's 220mn rural-migrant workers are not classified urban, and cities like Houston and Brisbane would not be classified as 'urban' under China's urbanization threshold for population density. One consequence of surging economic activity in isolated segments of the economy has been a material widening in income inequality – the ratio of urban to rural per capita income has increased sharply from 1.9x to 3.6x since 1985 (Figure 5). This is problematic for an Administration striving for a 'harmonious society' as part of the social contract<sup>9</sup>. In short, imbalances in credit growth, fixed asset investment and income inequality have only intensified since Premier Wen Jiabao declared China's growth dynamic to be, "unstable, unbalanced, uncoordinated and unsustainable" more than four years ago<sup>10</sup>.

Another interesting feature of Figure 1 is that over the full span of US economic history, the only instance where US economic policy was able to aggressively pull forward demand and generate anything approaching China-like per capita real growth rates was the period between the end of the Great Depression (when base effects were extremely favorable) and the ramp-up of the industrial-military complex associated with the active engagement of the US in WWII. The hangover from this period of artificially stimulated production turned out to be rather unpleasant - real per capita US GDP declined in four of the five years immediately following the cessation of hostilities, including a purge of 13% in 1946, and in spite of the Fed-Treasury Accord which keep interest rates at artificially low levels<sup>11</sup>.

<sup>7</sup> See "The Asia Investor Letter: Credit Dynamics in China", March 2010.

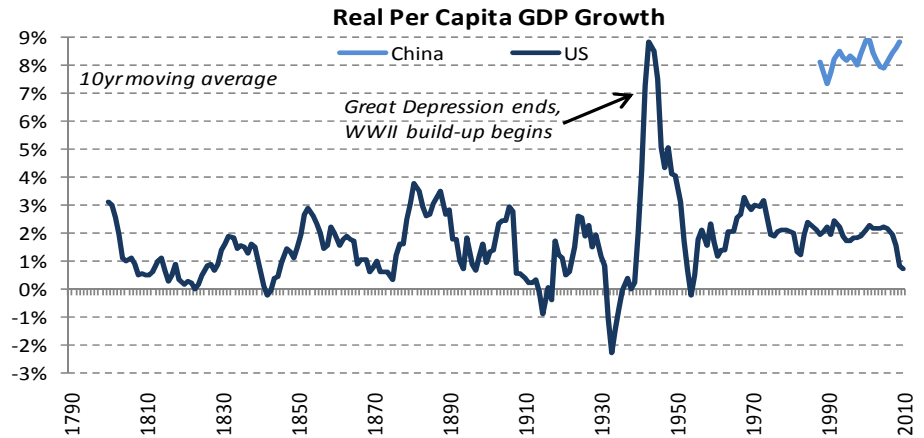
<sup>8</sup> There are two primary reasons the official urbanization rate in China may be understated. First, China's definition of an urban center incorporates cities with a much higher population density threshold (above 1500 people per square kilometer) than is common in Western countries. Second, under the hukou household registration system established back in 1955, there are now 220mn rural migrant workers currently working in urban areas according to the most recent Population Census, but not officially registered with local government authorities as urbanites. A widely cited 2009 OECD report ('Urban Trends and Policy in China') similarly concluded the scale of China's urbanization is likely to be considerably understated by official definitions. Most estimates we have seen disputing the official numbers tend to suggest it could be understated by 7-12 percentage points.

<sup>9</sup> In "The Geopolitics of China", George Friedman noted the Chinese leadership are faced with the following conundrum: to get rich, China needs to trade with the world as the purchasing power of half of the local population is still anemic, but the benefits of international trade accrue overwhelmingly to the owners of capital assets on the Eastern Seaboard who are already almost 4 times wealthier than their inland brethren. While Mao sought to create a unified Han China, one way he achieved this was to make everyone incredibly poor by severing ties to international trade.

<sup>10</sup> National People's Congress annual press conference, 15 March 2007.

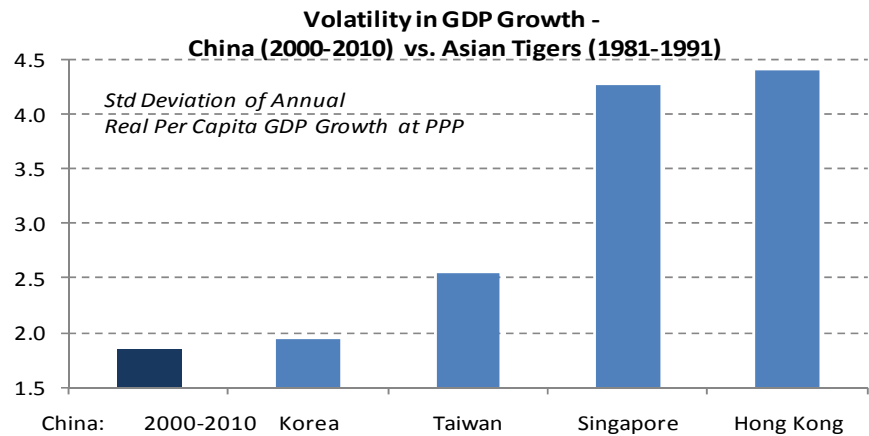
<sup>11</sup> Real per capita GDP fell 2.2% in 1945, 12.6% in 1946, 2.8% in 1947, rose 2.6% in 1948 before falling 2.2% in 1949.

**Figure 1: China's real per capita GDP growth – 6x faster than the US in the 19<sup>th</sup> century**



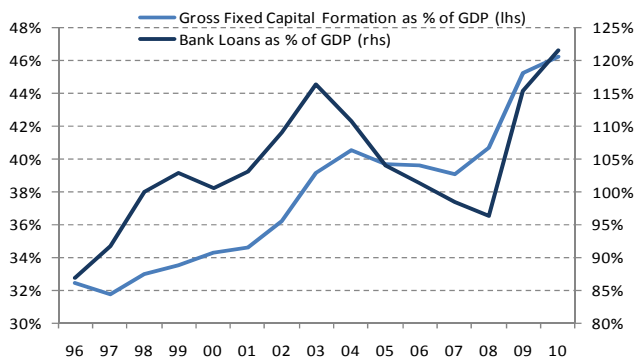
Source: Deutsche Bank, MeasuringWorth

**Figure 2: Growth volatility in China – a fraction of the Tigers**



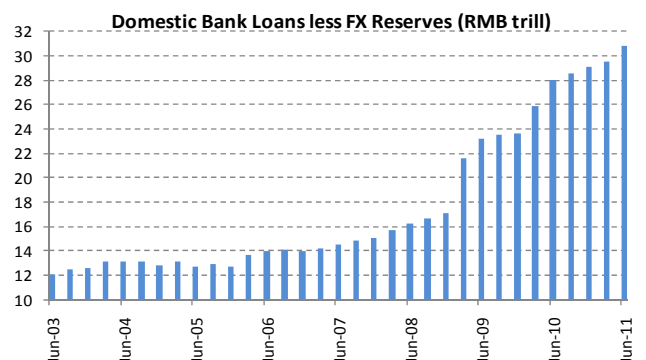
Source: Deutsche Bank, Haver

**Figure 3: Rebalancing?**

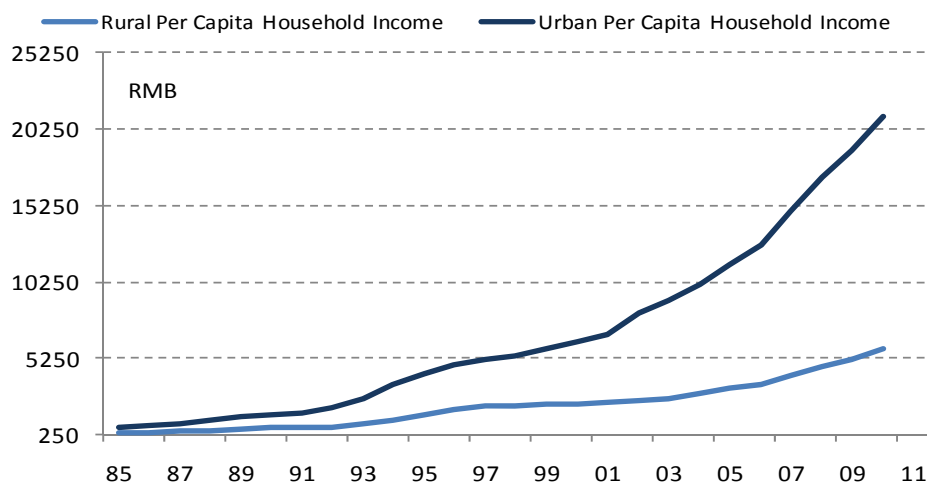


Source: Deutsche Bank, CEIC

**Figure 4: FX reserve growth hasn't kept pace with credit**



Source: Deutsche Bank, CEIC

**Figure 5: Income inequality in China**

Source: Deutsche Bank, CEIC

A related concern that arises in comparing the US development experience with China is that the longer US boom period from 1790 to World War One - which catapulted the US from colonial backwater to the mantle of the world's largest industrial producer - was actually associated with frequent recessions (Figure 6). For instance real per capita GDP fell one in every three years, and more than fifteen recessions took hold<sup>12</sup>. So while the early-stage US growth experience (which ultimately provided a formidable launchpad) was one of constant 'purge-and-renewal', in stark contrast there has been no such liquidation of excess in China since reforms began - the 'business cycle' is now into its fourth decade, and the 10-year rolling average on real per capita growth has never dipped below 7.7% (thus the 'Beijing Consensus' model of development has recently won many admirers). However Japan's credit and fixed asset bubble in the 1980s generated remarkably similar rates of heady GDP growth with low variability (Figure 7)<sup>13</sup>. In other words, rapid and stable GDP growth by itself is unlikely to be a reliable indicator of robustness - the opposite is more likely the case where excessive credit and fixed asset investment are involved. Along these lines, the late Hyman Minsky issued a prescient warning on the paradox of financial stability two decades ago<sup>14</sup>,

*"The first theorem of the financial instability hypothesis is that the economy has financing regimes under which it is stable, and financing regimes in which it is unstable. The second theorem of the financial instability hypothesis is that over periods of prolonged prosperity, the economy transits from financial relations that make for a stable system to financial relations that make for an unstable system. In particular, over a protracted period of good times, economies tend to move from a financial structure dominated by hedge finance units to a structure in which there is large weight to units engaged in speculative and Ponzi finance. Furthermore, if an economy with a sizeable body of speculative financial units is in an inflationary state, and the authorities attempt to exorcise inflation by monetary constraint, then speculative units will become Ponzi units and the net worth of previously Ponzi units*

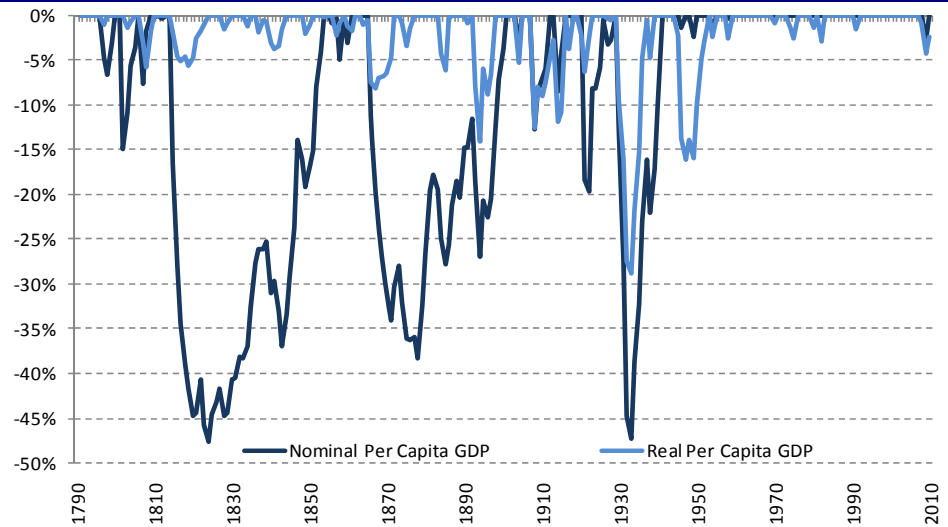
<sup>12</sup> The NBER has dated business cycles back to 1854, and records fifteen recessions from 1854-1913. Between 1790 and 1854 a consensus has emerged that up to a further 14 recessions took place. On this basis, 35% of years saw a contraction in nominal per capita GDP between 1790 and 1913, or 29% based on real per capita GDP.

<sup>13</sup> There are however some important differences between Japan's experience in the 1980s and China today. See, The Asia Investor Letter: "China and the Ghosts of Japan's Heisei Bubble", November 2010.

<sup>14</sup> "The Financial Instability Hypothesis", Working Paper No. 74, May 1992.

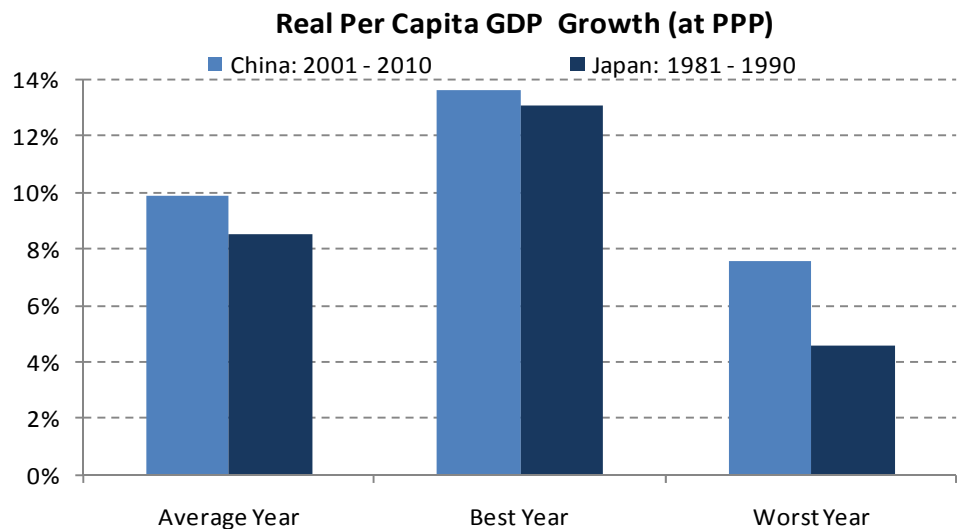
will quickly evaporate. Consequently, units (investors) with cash flow shortfalls will be forced to try to make position by selling out position. This is likely to lead to a collapse of asset values”.

**Figure 6: Peak-to-trough declines in US GDP – “purge and renewal” was standard fare**



Source: Deutsche Bank, MeasureWorth

**Figure 7: Stability – a misleading guide to affairs?**



Source: Deutsche Bank, IMF, Haver

It is of course entirely possible that China's high growth/low volatility experience over recent decades is the result of superior policy making institutions and therefore there are grounds for it to continue indefinitely – after all, China has had the advantage of studying the boom-bust development cycles of the US, Japan, the Tigers and other countries. But we would issue a degree of caution in this regard. First, despite a century of policy making experience<sup>15</sup> (and with more than 200 PhD economists on its staff), the Federal Reserve (among others) failed to detect the impending global financial crisis. Second, the more established industrialized central banks have arguably an easier task than policy institutions in China (in the case of the former, social stability is not in the dual mandate). As the past three decades have amply demonstrated, China's banking system is frequently called upon to perform national service by way of credit extension for non profit-maximizing reasons<sup>16</sup>:

*“In China, the banks are the financial system – nearly all financial risk is concentrated on their balance sheets. China's heroic savers underwrite this risk – they are the only source of capital inside the system ... the Party treat its banks as basic utilities that provide unlimited capital to state-owned enterprises ... capital begins and ends with the Big-4 banks, which control 43 percent of China's total financial assets. Such a concentration of financial assets in the banking system is typical of low-income economies. (But) what differs in China's case however is that the central government has unshakeable control of the sector ... foreign banks hold just 1.7 percent of total financial assets”*

Irrespective, history will be the ultimate arbiter of the policy making apparatus on the mainland, but we believe the international investment community is justified in beginning to apply a larger risk premium to a growth model well calibrated to minimizing short-term unemployment, but less adapt at generating return on equity. We worry China's aversion to tolerating even a temporary rise in unemployment, let alone a full business cycle, may result in a further intensification of imbalances, particularly in the banking system (this in turn will require continued repression of household savings). In short, we are not confident a new form of economic alchemy has been discovered as some more optimistic observers have implied<sup>17</sup>, and as we caution in Part II below, the post-bubble international experience has typically seen investors apply a harsh book value multiple (~parity) on the financial sector in the face of significant uncertainty.

China's property market occupies a special place in the intersection of capital investment and credit. Sharply deteriorating housing affordability, notably in larger cities, has raised a red flag for some time both inside and outside China. Our research team recently noted<sup>18</sup>,

*“Even if China was able to keep income growth at 10%, it would take 20 years for affordability of current house prices to come down to European levels ... the five most economically important cities – Beijing, Shanghai, Shenzhen, Tianjin and Guangzhou – alone make up 15% of total GDP ... it is therefore worrisome that it is exactly these cities where we have found the strongest indication for housing bubbles”.*

<sup>15</sup> While the Federal Reserve did not come into operation until December 1913 (partly in response to the financial panic of 1907), the US economy was not entirely rudderless before this time – Congress had experimented with some aspects of central banking more than a century earlier with the charter of the First Bank of the United States (1791-1811), the Second Bank of the United States (1816-1836), and the National Banks (1863 – 1913).

<sup>16</sup> “Red Capitalism”, p.25-27, Walter and Howie.

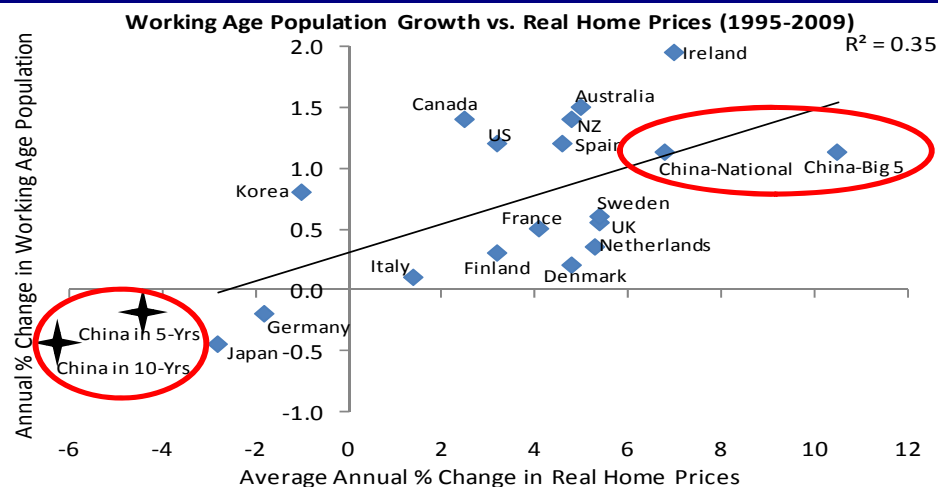
<sup>17</sup> In a related context, Edward Chancellor at GMO provides a broader treatment of financial fragility emerging in China in, “China's Red Flags”, GMO White Paper, March 2010.

<sup>18</sup> “China's Housing Markets”, DB Research, 28 April 2011.

Beyond affordability considerations, we have taken particular interest in analyzing the relationship between demographics and home prices (in China and abroad). Unlike credit growth, interest rates or supply conditions, demographic drivers are particularly durable, and as such are (unusually) useful in forecasting applications. In related work on advanced economies, a recent paper by the Bank of International Settlement<sup>19</sup> concluded that demographic factors affect real house prices significantly, ageing is likely to affect future asset prices substantially negatively, and that the impact seems to be strong enough to think about its implications in pension provision, financial stability and government debt sustainability.

Figure 8 is instructive in this regard. After plotting changes in the working age population (vertical axis) against real home prices (horizontal axis) across a host of countries since 1995, a reasonably tight fit emerges. At the national level, the average annual increase in real home prices in China (6.8%) over the past decade does not appear out of line with the international experience (encircled, top right quadrant). For larger cities on China’s Eastern Seaboard however (“China-Big 5”), an average annual real rise of 10.5% does look more stretched. Irrespective, if we combine the panel regression model with a projection for Chinese labor force growth over the next five and ten years (bottom left quadrant), a somewhat troubling picture emerges - the model suggests real home prices could decline by an annual average 4% (over the next five years) and 6% (over the next decade). In short, the contraction in the Chinese labor force beginning next year (Figure 9) is likely to compound affordability issues, and points to falling real home prices after a decade of solid tailwinds.

**Figure 8: Working age population forecasts suggest lower real home prices for China**



Source: Deutsche Bank, IMF, OECD, UN. The chart is adapted from initial IMF estimates which did not include China. Figures for China are from 2000-2010. “China-National” denotes the nation-wide increase in real home prices, while “China-Big 5” denotes the increase in real home prices for Shanghai, Beijing, Tianjin, Guangdong and Chongqing. The black stars for China in the lower left quadrant are based on combining labor force growth projections with the panel regression model.

<sup>19</sup> “Ageing and Asset Prices”, BIS Working Papers, no. 318, August 2010.



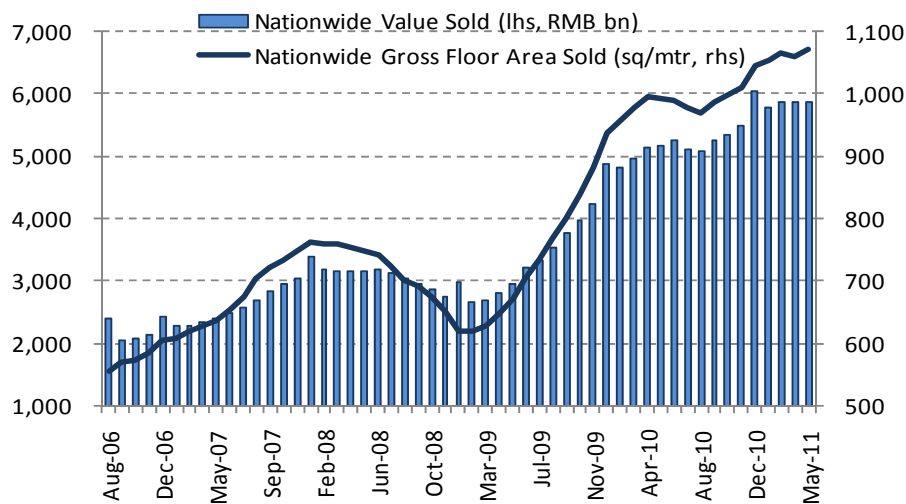
**Figure 9: The Chinese labor force – contraction ahead**



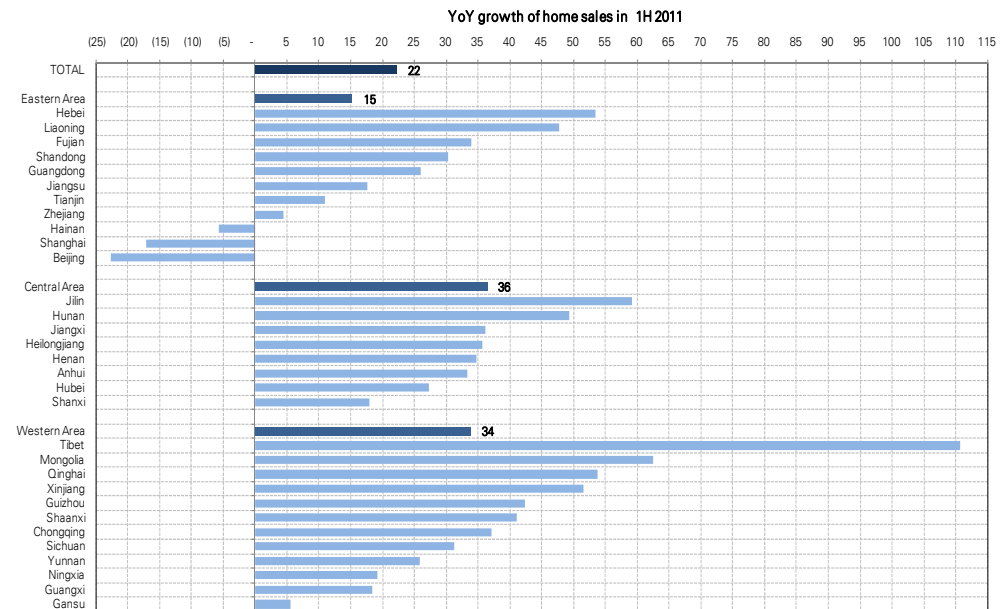
Source: Deutsche Bank estimates

The extent to which China’s relatively low mortgage debt/GDP ratio (16%, vs. 71% in the US) will cushion against these factors remains to be seen. The Japanese experience post-1991 was compounded by all three drivers heading in the wrong direction – a decline working age population, a lack of affordability, and an extremely high private credit share of GDP. Recent data suggests a stagnation or modest decline in both prices and transaction volumes along China’s Eastern Seaboard (for instance new home prices were down 7% in Beijing in May), however activity has rotated to Tier II and III cities (where tightening measures have been relatively absent) in the past few months and driven the nationwide aggregates to new highs (Figures 10 and 11).

**Figure 10: China’s property market**



Source: Deutsche Bank, Soufun. Both figures are a 12month rolling sum.

**Figure 11: Tier I city property markets are starting to creek, but not the rest**

Source: CEIC

The relatively opaque accounting behind China's recent credit boom has understandably prompted some investors to conduct hypothetical "*in extremis*" scenarios for the banks and local and federal Government. A few reference points may help frame the discussion:

- Domestic bank credit accounts for more than 120% of GDP, of which the state-owned majors account just under half. An NPL cycle in line with that experienced a decade ago (35% with 20% recovery) would generate hypothetical losses across the state-owned banks equivalent to 16% of GDP, or around a third of China's FX reserves. We should point out however an increase in federal government debt of anywhere close to this figure would almost certainly be recorded and amortized over a decade or two.<sup>20</sup>
- There is a precedent for China using its FX reserves to address a capital shortfall in the banks – in the last NPL cycle reserves were effectively injected into four 'bad bank' asset management companies as capital, and used to rid each of the majors of NPLs. In return for divesting their NPLs (mostly at face value), the banks received bonds yielding 2.25. The underlying solvency of the asset management companies holding these NPLs remains a matter of heated conjecture. Moreover the Big-4 (listed between 2005-2010) were also capitalized in part with the aid of FX reserves. However total system-wide loans in China exceed FX reserves by around 70% of GDP, so there is only so much heavy-lifting this source of capital could perform in a bone fide crisis.
- While the official federal debt/GDP ratio stands at around 20 percent, this figure is widely thought to be understated as it excludes a recent estimate from the National Audit Office of the debt associated with local government financing platforms (26.9%), as well as

<sup>20</sup> This has been the experience with the four existing AMCs. It is beyond the scope of our analysis here to estimate possible second-round fiscal effects (ie. a collapse in revenues) associated with an NPL cycle of this magnitude.

receivables and bonds of the Ministry of Finance, Ministry of Railways and the debt of the three policy banks (equivalent together to ~25% of GDP). These two figures would put federal debt in the order of 71.8%<sup>21</sup>. Adding to this figure an estimate of the social security funding gap by the People's Congress produced last year (25%) would increase federal indebtedness to 96.8% of GDP<sup>22</sup>. We would however interpret this latter estimate with a good deal of caution as the funding status of China's pension system is notoriously opaque<sup>23</sup>.

**Figure 12: One balance sheet, two possible reporting conventions**

	Share of GDP	\$USD equiv (tn)	
Conventionally reported = 19.9%	Central Govt Bonds	15.0%	0.92
	Asset Management Corp	3.50%	0.21
	Foreign Debt	0.90%	0.05
	Local Government Bonds	0.50%	0.03
Adjusted measure = 96.7% incl. pensions or 71.7% excl. pensions	Local Govt Financing Platforms	26.9%	1.64
	MoF, MoR, Policy Banks	25.0%	1.53
	Unfunded Social Security	24.9%	1.52

Source: Deutsche Bank, National Audit Office, Sina.com

A brief digression is in order. In parts of the world that are susceptible to forest fires like California and Australia, it is standard operating procedure for firefighters to preside over small frequent fires at the beginning of each summer, in a process known as controlled burn-off. This is a risk mitigation strategy designed to prevent an accumulation of dry fuel (kindling) that could eventually become unmanageable, devastate an entire forest and inflict lasting damage. We think there is a strong message in this approach for economic policy makers: Attempting to iron out every short-term blip in the economic cycle is likely to be a sub-optimal long-term strategy. A forest subject to frequent but controlled burn-off cannot accumulate dry fuel and so is relatively robust to severe damage. We should be clear – we are not advocates of “unconditional liquidation” as made (in)famous by Depression-era Treasury Secretary Andrew Mellon in his advice to president Herbert Hoover, “Liquidate labor, liquidate stocks, liquidate farmers, liquidate real estate... it will purge the rottenness out of the system”. Our point is it is more prudent for policy makers to prevent the accumulation of imbalances in the first instance by not intervening aggressively in mild recessions – the modest downturns of 1990, 1998 and 2001 in the US are a case in point<sup>24</sup>. Admittedly, pursuing a strategy along these lines will require considerable fortitude on the part of its practitioners, especially in the face of political pressure (politicians tend not to be returned to office when the job market is sagging), and so is likely to be easier said than done.

<sup>21</sup> Other observers including Victor Shih and Gary Shilling have estimated China's debt/GDP ratio in excess of 100%.

<sup>22</sup> This estimate is now a year old, and available on sina.com in Mandarin.

<sup>23</sup> More broadly, reform in addressing China's looming pension has been slow moving (while urban pension coverage is high at around 90%, rural pension coverage is typically recorded at levels around 10%; moreover the depth of the coverage is generally considered inadequate). We expect large-scale asset injections into China's pension system will be a key pillar in at least partially shoring up the system. Unsurprisingly, the large state owned enterprises, many of whom will be stripped of assets as part of this process, have been resistant to pension reform.

<sup>24</sup> George Cooper, a former colleague, makes a similar point in his forceful critique: “The Origins of Financial Crises”. We are mindful of the counterfactual here – had the policy response not been as aggressive as it was in these instances, we cannot know with certainty what would have been the outcome.

## Part II – A Primer on Hedging

In opening remarks at a February 2002 Defense Department press conference, former US Defense Secretary Donald Rumsfeld delivered a now famous (if somewhat contorted) dictum on the difficulties of real-time decision making with imperfect and incomplete intelligence information,

*“There are known knowns – there are things we know we know. We also know there are known unknowns – that is to say we know there are some things we do not know. But there are also unknown unknowns – the ones we don’t know we don’t know”<sup>25</sup>.*

While unlikely to rank among the more eloquent statements ever delivered (he was subsequently criticized by the “Plain English Campaign” for abuse of language), the underlying message is a prescient one for investors seeking to risk manage portfolios against a host of possible scenarios. In response to growing client demand, and in light of the inherent uncertainties associated with taking a longer-term view on fragility in China (not limited to data quality issues), we discuss below the costs, benefits and potential payoffs associated with a range of hedging options (with varying degrees of basis risk) across equity, FX, credit, rate and commodity markets<sup>26</sup>. As China’s financial sector will likely be at the pointy-end of any future potential growth shock, we lean our discussion more heavily on equity-related (rather than systemic/global liquidity) hedging solutions. Our analysis is designed to be indicative and instructive, though not exhaustive.

Before proceeding some general comments are in order. We are cognizant that tail-risk protection is not immune to valuation considerations – as is the case with any investment, and as Charlie Munger likes to warn, not even the very best of investment ideas can survive an exorbitant entry price<sup>27</sup>. In order to make the analysis tractable, we also need to impose some constraints around what exactly it is investors might seek to hedge. The general tone of our dialogue with clients suggests the range of concern lay somewhere between a ‘growth recession’ (ie. 4-7% GDP growth) and a complete implosion of the property market and banking system<sup>28</sup>. Given the lack of volatility in Chinese GDP growth over the past three decades, even a growth recession would qualify in our books as a tail-event (though not technically a black swan<sup>29</sup>) as it would constitute a multi-standard deviation event and is well below consensus GDP forecasts of 8.5% for 2012. For instance a 2-4 standard deviation event would put Chinese GDP growth in the 6.5–3.5% range<sup>30</sup>. An added complication

<sup>25</sup> Black swans are a subset of the latter. Readers may be interested to know Donald Rumsfeld has recently released a memoir entitled, “Known and Unknown”. The book has attracted broadly equal measures of scorn and praise. We found it to be a quite fascinating insider’s view nonetheless.

<sup>26</sup> The intellectual case for shorting China seems considerably easier to us than the implementation.

<sup>27</sup> For a related discussion see, “A Value Investor’s Perspective on Tail Risk Protection: An Ode to the Joy of Cash”, by James Montier at GMO.

<sup>28</sup> Interestingly, we have observed an inverse correlation between the geographical proximity of our clients to China, and the degree of bearishness on China. Most of the more dire hypothetical scenarios tend to originate from our clients in the North East of the US, and to a much lesser extent, Europe. By and large, investors in Asia and Australia either seem to be suffering ‘crisis fatigue’ when it comes to China, or simply don’t consider an accident in China a sufficiently high probability event to warrant hedging, irrespective of the potential payoff.

<sup>29</sup> We do not deal with black swans explicitly here, based on Nassim Taleb’s definition of a black swan event as one which is i.) unpredictable, ii.) has an outsized impact, iii.) is made to appear more predictable than was the case in real time. Nevertheless, the black swan has long captured our attention for various reasons, one of which (the most frivolous) is that it was first discovered in this author’s home town.

<sup>30</sup> Standard deviation is of course, a next-to-useless metric to apply when attempting to measure risk, but for our illustrative purposes here, we can live with it.

associated with building out hedging strategies for China is that GDP growth may be slow do reveal the nature of building stresses - there is seemingly no physical constraint in the short-run on China again turning on the credit spigot and embarking on another round of infrastructure related spending that would keep the labor market tight and generate solid headline GDP prints (again leaving the tab with households and foreign equity investors in the banks). Finally, while it is an interesting intellectual exercise, we stop short of explicitly addressing a systemic 'China implosion' below (ie. a long period of negative GDP growth possibly coupled with social turmoil, etc). While the second-order impact on the rest of the world is difficult to handicap, an event along these lines would obviously constitute a severe deflationary shock for the global economy, and so a revisiting of the 2008 lows for many growth-sensitive assets would seem a reasonable template. More generally, investors interested in protecting (intergenerational) wealth in a period of extreme socio-economic upheaval may find Barton Biggs' historical treatise, "Wealth, War and Wisdom", of particular interest in this regard.

### 1. Asian Equity Volatility

Last September we argued Asian equity index volatility was turning decidedly cheap, particularly relative to other parts of the world<sup>31</sup>. For instance six-month ATM implied vols in Korea and India traded 6%pts and 4%pts below the US respectively, while H-share vols were unusually trading on par with the US. Since that time the cost of broad index protection in Asia has mostly edged sideways (Figure 13). We present an update of the cost of protection across Asian equity indices in Figure 14. A few observations stand out:

- *Cross Market Beta's*: The beta of the most liquid and tradable regional markets vis-à-vis the MSCI China financials index (based on weekly returns over the past year) has predictably been highest for the H-share market (0.99), followed by the Hang Seng (0.78), Kospi (0.43), Nikkei (0.40), ASX200 (0.36), and finally, Taiex (0.30). Interestingly, both Brazil (0.46) and South Africa (0.38) have quite high betas (Russia just 0.30), though we have not included them in our derivate-based analysis below for liquidity reasons (given Brazil's increasing economic links to China coupled with emerging evidence of a domestic credit bubble, some investors may wish to pursue this further). For the major markets we find beta's of 0.34 (S&P500), 0.29 (Eurostoxx) and perhaps surprisingly, just 0.26 for the DAX;
- *Variance Swaps*: Unless one is confident of a significant shock (in China or elsewhere) within the next six-twelve months, variance swaps in Asia are probably not an ideal hedge at this juncture (variance swaps payout on the difference between realized and implied volatility). Hurdle rates relative to realized volatility are quite elevated at the present time<sup>32</sup> (forward-starting variance swaps can mitigate this hurdle to some degree), swaps do not offer an asymmetric risk/reward profile like puts or put spreads, and most importantly, because liquidity in these securities is poor outside of one year in Asia, timing is of the essence. For investors in search of crisis protection over the next six-twelve months, it would however be remiss not to mention that breakeven levels for variance swaps are a long way below 2008/09 peak crisis levels of realized volatility;

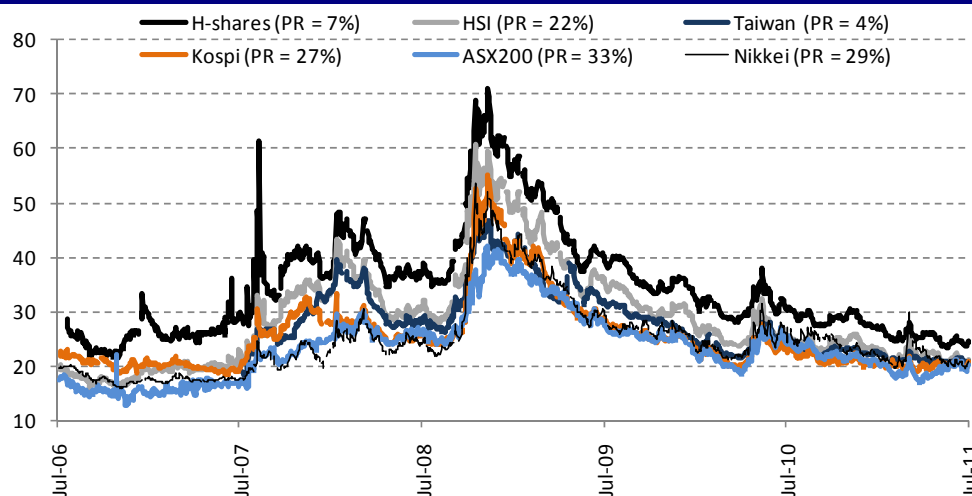
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<sup>31</sup> The Asia Investor Letter: "Asian Equity Vol – The World's Cheapest Buy?", Sept 2010.

<sup>32</sup> The notable exception here is Japan, though realized vol has been inflated by the impact of the Tsunami.

- *Vanilla Puts/Put Spreads:* As Figure 13 illustrates, implied volatility (1y 95% strike) for each market in Asia is currently bouncing along the bottom of the five-year range. Notably, H-share implied volatility is trading in the bottom quintile (7<sup>th</sup> percentile). As the volatility term structure between the 6mth and 2y tenors is flat in each market, this represents a relatively attractive opportunity for investors to get set in longer-dated fixed-cost strategies with the potential for asymmetric payoffs. After accounting for skew, Korea may represent the most efficient hedge in this regard, as a variety of put spreads have max gain/max loss ratios above 4x, and Korea is more highly correlated to China's financials than Japan, Australia or Taiwan (each of which have put spreads with lower payoff ratios).
- *Zero-cost Leveraged Structures:* For leveraged investors in search of zero-cost strategies, the bottom panel in Figure 14 displays the put strike that could be purchased for no cost, based on the sale of a 5% OTM call option. Korea again appears especially interesting – a 2yr put struck just 1.9% OTM could be financed through the sale of a 5% OTM call, while the sale of the same call in Taiwan can only finance a put option struck 27% OTM. The catch with these strategies of course is the maximum loss is potentially unlimited in the event of a rally in spot (though this loss exposure can be addressed by buying back calls with a strike higher than that sold).
- *Best-of-Puts, Conditional Puts and Outperformance Options:* Investors prepared to move out along the exotic spectrum are limited only by their imagination (and the stomachs of their risk managers), so we will limit ourselves here to simply mentioning that imposing a degree of conditionality on hedges can cheapen them quite dramatically. However in the spirit of Einstein's quip that "matters should be made as simple as possible, but no simpler", our experience is that the imposition of too many degrees of freedom can quickly become counter-productive. By way of illustration: a plain vanilla 1y 95% put on the HSI costs ~8% at the time of writing, while the premium on a 95% strike best-of-put basket which pays out on the best performing of the HSI, Korean and Australian markets over the reference period is around 3.5%, a sizable cost saving given these markets are likely to be highly correlated in the event of a growth shock on the mainland (a long best-of-put position is a synthetic way to take a long correlation position, a nice feature for a rainy day). Conditional puts might also appeal to investors looking to cheapen up two vanilla hedges and take a long correlation position – an equity index put that is conditional on a move in gold up to say \$2000 an ounce is a standard example. Similarly, as an alternative to risk-undefined spread trades between two (or more) securities, long option positions can easily be constructed to payoff on relative performance but with a pre-defined maximum loss (for instance a 1yr outperformance option that pays out on the relative performance differential between US large caps and H-shares).

**Figure 13: 1y 95% strike implied volatility in Asia – bouncing along the bottom**



Source: Deutsche Bank. Figures in parenthesis denote the percent rank over the five-year sample. For instance H-share vol is currently in the bottom 7<sup>th</sup> percentile.

**Figure 14: Equity index protection in Asia**

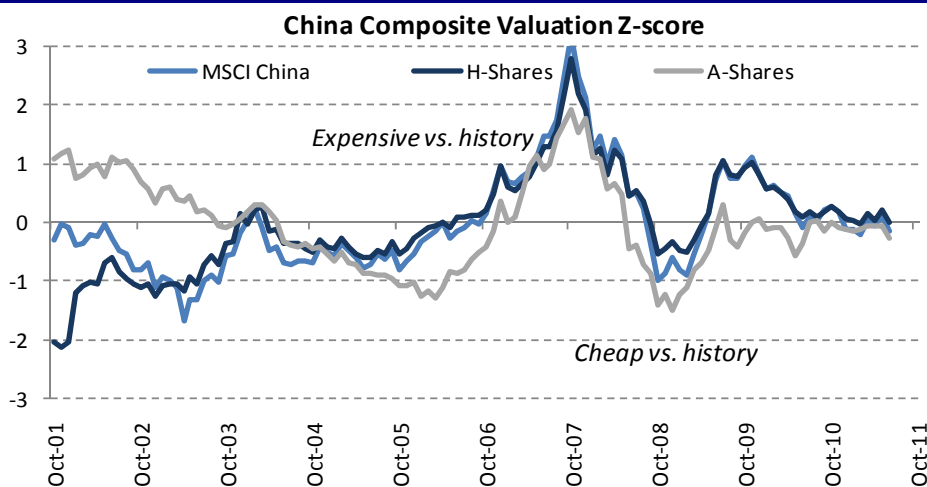
		HSCEI	HSI	KOSPI-200	Nikkei-225	ASX200	TWSE
<b>Weekly Beta vs. MSCI China Financials</b>		<b>0.99</b>	<b>0.78</b>	<b>0.43</b>	<b>0.40</b>	<b>0.36</b>	<b>0.30</b>
Realized Volatility	6mth	20.1%	16.8%	18.4%	26.4%	13.6%	15.1%
	1yr	19.7%	16.2%	16.1%	23.6%	13.4%	13.8%
	2yr	24.5%	20.1%	17.4%	22.8%	15.8%	16.3%
2008/09 Crisis Peak Realized Volatility	6mth	78.5%	63.5%	53.9%	61.4%	47.7%	40.6%
	1yr	67.0%	52.2%	16.2%	47.7%	38.3%	36.2%
	2yr	56.6%	45.2%	17.4%	38.9%	31.6%	31.9%
Variance Swap (offer)	Dec-11	28.9%	24.2%	24.8%	26.4%	22.9%	22.8%
	Jun-12	30.7%	26.7%	26.0%	27.4%	24.2%	24.6%
95% (Put Strike) Implied Volatility	6mth	27.5%	20.7%	22.2%	22.0%	21.0%	20.6%
	1yr	27.8%	19.9%	22.6%	21.9%	20.4%	20.9%
	2yr	28.3%	19.4%	23.3%	22.0%	20.0%	20.7%
95%-85% Put Spread Premium	6mth	3.50%	2.46%	2.16%	2.31%	2.11%	2.94%
	1yr	5.87%	4.06%	3.45%	3.97%	3.51%	3.97%
	2yr	8.88%	6.48%	4.88%	6.19%	5.07%	7.84%
Put Spread Max Reward/Risk Ratio (x)	6mth	2.9	4.1	4.6	4.3	4.7	3.4
	1yr	2.6	3.7	4.3	3.8	4.3	3.8
	2yr	2.3	3.1	4.1	3.2	3.9	2.6
OTM Put strike for a Costless Risk Reversal, (call written 5% OTM)	6mth	94.7%	92.1%	94.6%	91.8%	92.5%	85.3%
	1yr	90.6%	88.0%	96.4%	90.6%	92.7%	82.0%
	2yr	87.7%	83.4%	98.1%	88.5%	92.3%	72.6%

Source: Deutsche Bank, Bloomberg Finance LP. Indicative prices only, as at July 14, 2011.

## 2. A Word on Value in China

For value-focused real money investors who do not have a mandate to structure positions through derivatives (or view options in a similar light to WMDs), the first point to make is that the overall market in China, and financial sector in particular, has been de-rating for some time but is not yet cheap in our view (Figure 15 and 16). China was trading at fully-fledged bubble multiples in 2007 (financials were approaching 6x book value) and have been working off the excess for the better part of four years. In Minsky parlance, we are yet to reach the revulsion phase of the cycle which typically marks the bottom. For all the issues discussed earlier, we continue to think there are firm grounds for this sector to cheapen further (both in an absolute and relative sense)<sup>33</sup>. Relative to the late-2007 peak, China financials have de-rated from 5.7x to 1.8x book and from 35x to 10x trailing earnings (Figure 16). However the post-financial crisis experience in a number of regions (Japan twenty years ago, and more recently the US and Europe) cautions that book value tends to impart a gravitational pull on stock prices in the aftermath of a bubble. For instance, financials in both Japan and Europe currently trade 0.8x book, and 1x in the case of the US and UK - less than half the levels of five years ago in each case. This is also consistent with the more general empirical behavior of equities to overshoot on the downside following a bubble, before chopping sideways at historically depressed multiples for a considerable period of time as restructuring takes place. Against this backdrop, we would not be surprised to see investors apply similar multiples on the book value of China's financials. For the past eighteen months, the book multiple on Shanghai and Hong Kong listed property stocks has also been tracking sideways at 2x and 1.3x respectively (Figure 17). We think the investment community is justified in demanding a significant risk premium from this sector as well as the banks, and we should also note that short interest in related property and bank stocks has fallen back down to low levels in recent times. For the asset allocation community, we stick to our long-held view that underweighting/shorting China's banks relative to the heavily cashed up, modestly valued, strongly branded and globally focused non-financial large caps in the US and Japan<sup>34</sup>, retains considerable appeal.

**Figure 15: Mean reversion, or overshoot?**



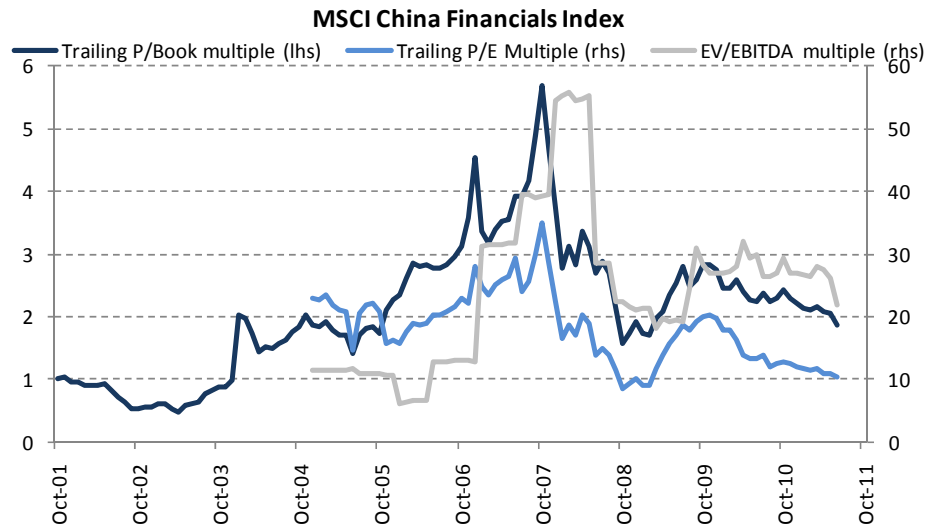
Source: Deutsche Bank, Bloomberg Finance LP. Composite value is derived from a weighted average of z-scores of the following metrics: P/B, P/E, DY, EV/EBITDA and FCF Yield. The most liquid of these, the H-share market, currently trades at 1.9x trailing book, 11.5x trailing earnings, 2.5% DY, EV to EBITDA of 6.5x, and a FCF yield of 2.9%.

<sup>33</sup> We made the case for sustained de-rating of China, in both an absolute and relative sense, nearly eighteen months ago. See, The Asia Investor Letter: "Credit Dynamics in China", March 2010.

<sup>34</sup> More generally, three-quarters of stocks in Japan now trade below economic book. The bad news is in the price.



**Figure 16: China financials – a multi-year cheapening?**



Source: Deutsche Bank, Bloomberg Finance LP

**Figure 17: China and HK property stock multiples - tracking sideways**



Source: Deutsche Bank, Bloomberg Finance LP

### 3. Credit / Interest Rate Markets

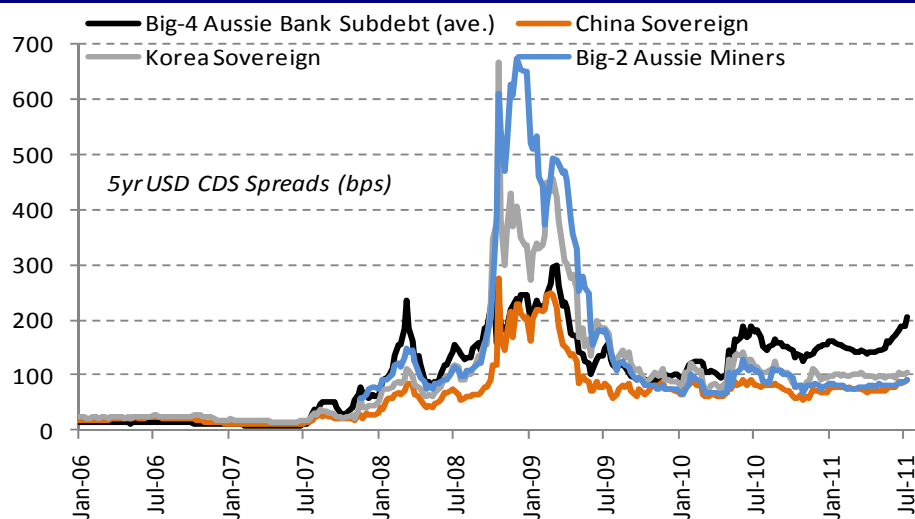
- China – there are a couple of obvious ways to position for a hard landing, namely through the Sovereign CDS and interbank markets. In the case of sovereign CDS, a perceived real estate or banking crisis would likely invite considerable speculative protection buying (and inversion of the CDS curve), particularly given the recent European experience where governments have absorbed private sector debt onto the balance sheet. However we would view buying of China sovereign CDS in a similar way to that of the US and Japan – a trigger event is highly unlikely as the government has negligible foreign currency denominated debt outstanding (~0.5% of GDP) and is unconstrained in how much domestic currency it could print *in extremis* (admittedly this did not prevent a blow out in 5yr CDS to almost 300bps in late 2008 – it currently trades at 91bps). China’s foreign exchange reserves (~50% of GDP) could be deployed to diffuse some of the bank shortfall (it is not clear if the bear-steepening pressure in the US Treasury market associated with the liquidation of some of China’s Treasury holdings would offset the bull flattening pressure from the deflationary shock to the global economy). On the interbank funding side, we note paying 2y IRS (3.85%) and receiving seven day repo is currently a marginally positive carry trade. However the receiving leg has been extremely volatile this year (the range has been 1.75%-9%) and it is not altogether clear how the cross currents in the money market would respond to panic on the one hand, and significant cuts in the required reserve ratio (currently at an all-time high of 21.5%) and another large credit expansion on the other<sup>35</sup>. Positive carry cross-currency swaps may be another option for macro investors (more below). Finally, we should mention that shorting China property cash bonds is both difficult (poor liquidity) and expensive (though not necessarily impossible), particularly after the recent widening which has pushed the yield of the median issuer out to the low-teens.
  
- Korea – Korea has been a significant beneficiary of Chinese growth and has the highest relative exposure to China (30% of total exports) in the world. Moreover, along with the household sector (household debt/GDP is 68%), the local banking system remains highly leveraged (loan-to-deposit ratio ~115%). However Korean authorities have taken a number of steps since the 2008 crisis to try and mitigate the threat of a repeat of the 2008 episode when 5yr sovereign CDS gapped out to 700bps (currently 106bps), including overseeing a sharp reduction in bank leverage (loan-to-deposit ratios are down 25%pts), and imposing strict limits on foreign currency borrowing and derivate exposure among the banks (leveraged KIKO structures created significant problems for the KRW in 2008). Note the sub-debt of Korean banks currently trade around 20bps inside that of their Australian brethren in the 5yr CDS market (albeit with less liquidity), while the sovereign trades 15bps wider than China in 5y CDS. Receiver swaptions in Korea are likely to appeal to those expecting the BoK to respond forcefully to a hard landing in China – this is a reasonable assumption in our view given how timid the BoK’s tightening cycle has been to date.
  
- Australia – Almost a quarter of Australia’s exports are now consumed by China. Like Korea the banking system and household sectors are highly leveraged (in absolute and relative terms), and low-strike receiver swaptions have attracted increasing interest as disaster insurance hedges. The 2Y1Y rate has rallied by 100bps since February and the curve is now priced for an easing (at odds with the RBA’s policy bias). This makes hedging a little more nuanced. If investors seek to protect portfolios against a growth scare, but are not particularly concerned with a systemic meltdown, then receiver ratios

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<sup>35</sup> We thank our China rates strategist Linan Liu for pointing this out.

or vanilla receiver spreads should appeal as downside strike vol/skew is very rich at present<sup>36</sup>. For instance long \$100m of a AUD 2Y\*1Y 5.10% receiver, funded with \$200m of a 2Y\*1Y 4.05% receiver is zero cost, and the payoff is positive in the event the RBA rate cutting cycle stops just short of the early 2009 low. Similarly, buying \$100m of 2Y\*1Y at 4.75% vs. selling \$100m at 4.25% generates a net premium cost of 15bp, with a maximum payoff 35bp. While 41% of Australian bank assets consist of residential mortgages, and the property market is now deflating from very elevated levels, our local credit and equity strategists expect the Big-4 to comfortably absorb a fall in the order of 30% in the Australian property market owing to their oligopolistic pricing power (which has increased post-2008), healthy deposit growth (which reduces wholesale funding requirements) and capital buffers. We note the cost of sub-debt protection on the Australian banks had widened considerably in recent times (beyond 200bps) and no longer strikes us as great value (Figure 18), particularly given the health of the sovereign balance sheet (federal debt/GDP is just 22%). Sovereign CDS on the Australian government is the cheapest credit hedge available in Asia (61bps), but given an average 5yr CDS spread of the Big-2 miners trades just 30bps wider and on par with the Chinese Sovereign, the miners appear a more attractive tail hedge in our view (they do not have a printing press *in extremis*).

**Figure 18: CDS spreads in Asia**



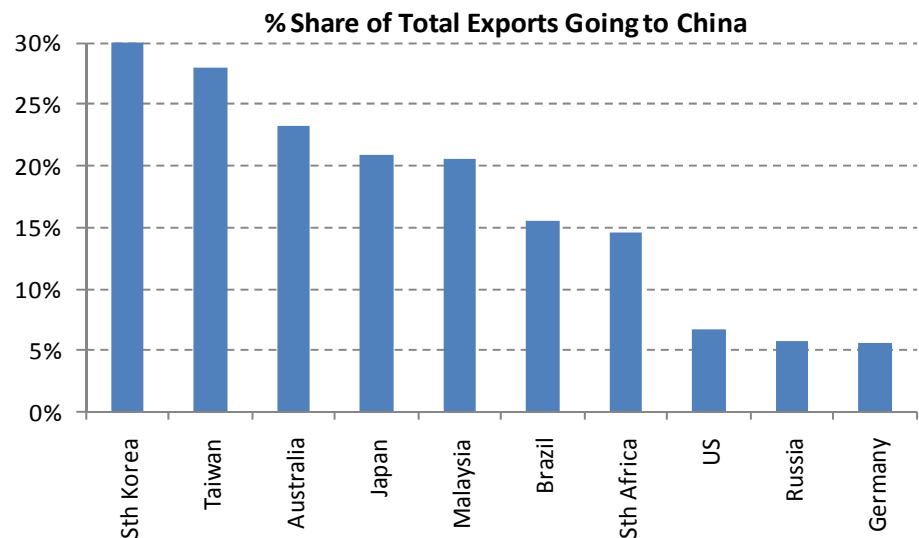
Source: Deutsche Bank

<sup>36</sup> Thanks to Kenneth Crompton, our Australian RV rates strategist, for alerting us

#### 4. Currencies and Commodities

One way in which to assess the potential currency sensitivity to a meaningful slowdown in China is to examine the role that China plays in the composition of total exports for each of her trading partners. Figure 19 does just that. Almost one third of Korea's exports go to China, around one quarter for Taiwan and Australia, and a fifth of total exports for Japan and Malaysia go to China. Around 15% of total exports in the case of Brazil and South Africa are now bound for China. In short, North Asia and the commodity exporters are clearly most heavily exposed.

**Figure 19: North Asia and commodity exporters are most exposed to a hard landing**

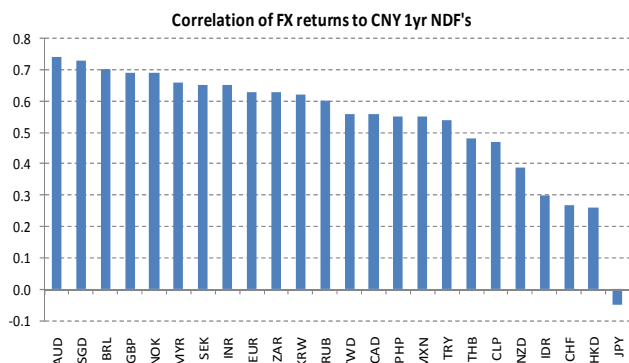


Source: Deutsche Bank, National sources

Another way to tackle the issue is to examine the correlation of currency returns to both the 1yr RMB NDF, and to the equity returns of the Chinese financial sector (Figures 20 and 21). Unsurprisingly we find commodity exporters and Asian currencies most heavily correlated. Interestingly, since the crisis AUD and KRW implied volatility appears to have regime-shifted upward, while that of BRL and ZAR has not. Similarly, relative to historical experience, downside skew protection is turning quite expensive in the AUD, moving sideways in the case of BRL and KRW, while cheapening for the ZAR. It would be remiss not to mention the notable increase in USD/CNY upside exposure (ie. CNY depreciation) sought by some investors in recent months (Figure 22). This is one of the few positive carry hedges available, though at the time of writing, an appreciation of just 1% in the renminbi was built into the 1y forwards. With the exception of the 2008 crisis, this is the most modest expectation of renminbi appreciation since the currency moved off its hard peg in 2005. If speculation intensified over the prospects of a banking crisis on the mainland, capital controls would almost certainly be tightened (in particular to prevent household deposits fleeing the banking sector). Taiwan is the only other country in Asia with tight economic and financial linkages to the mainland, where a short position in the currency also offers positive carry<sup>37</sup>.

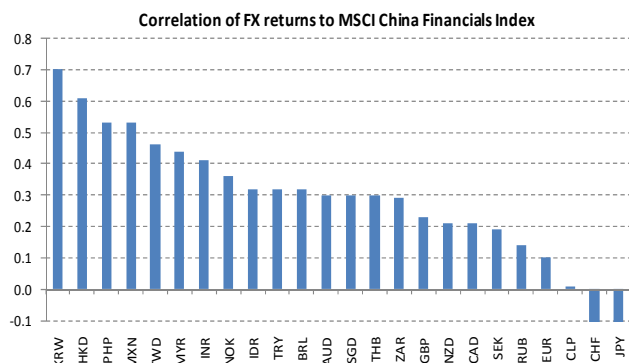
<sup>37</sup> Given Taiwan's sizable net international investment position, we would not expect an outsized rally in USD/TWD. For instance in the 2008 crisis, USD/TWD rallied just 15%.

**Figure 20: Currency sensitivity to CNY**



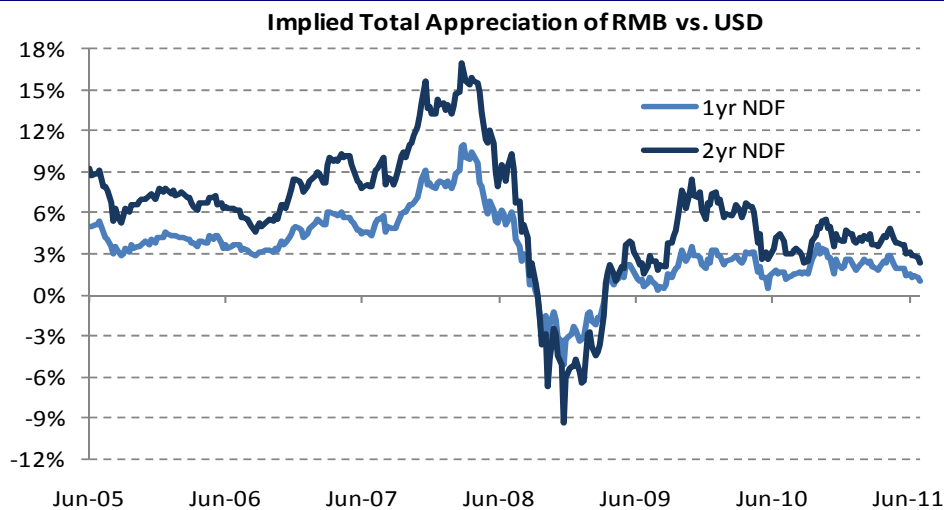
Source: Deutsche Bank, Bloomberg Finance LP. Based on weekly returns. 1yr forward used in the case of HKD.

**Figure 21: Currency sensitivity to China's financials**



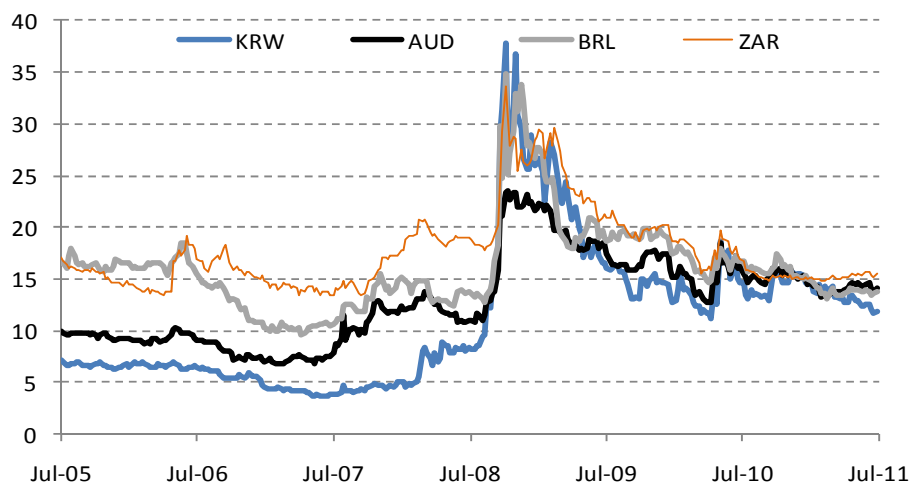
Source: Deutsche Bank, Bloomberg Finance LP. Based on weekly returns. 1yr forward used in the case of HKD.

**Figure 22: NDF markets are now pricing only very modest RMB appreciation**



Source: Deutsche Bank, Bloomberg Finance LP

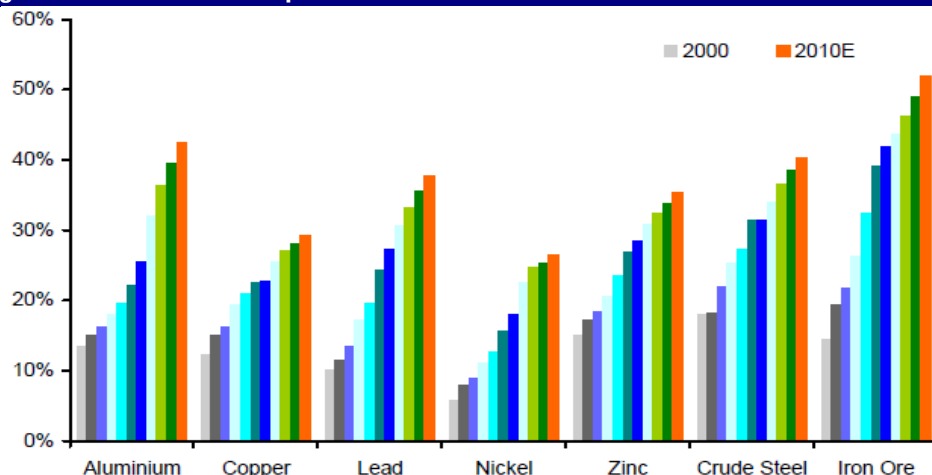
**Figure 23: Currency volatility among China-sensitive currencies**



Source: Deutsche Bank, Bloomberg Finance LP

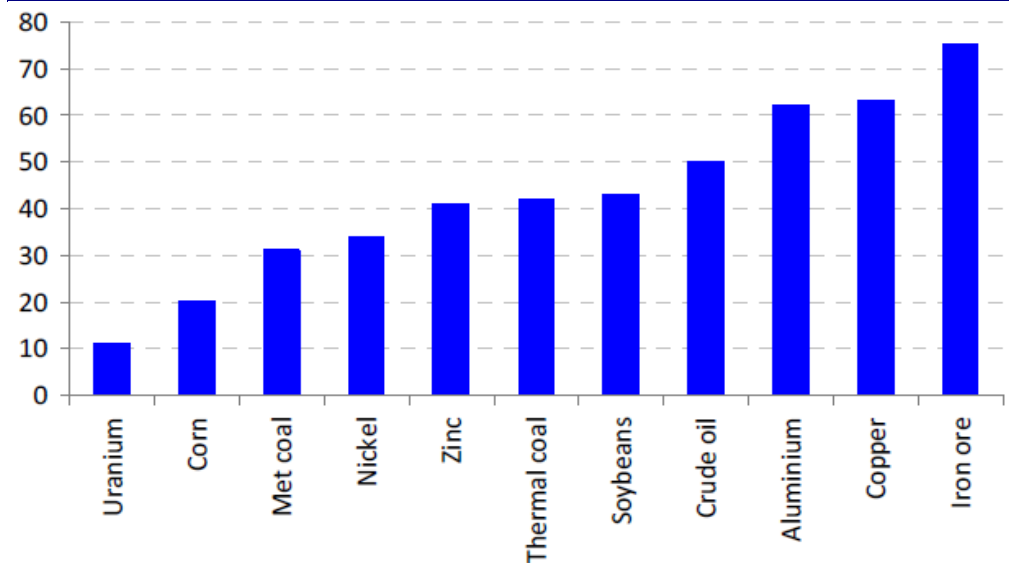
A final word on commodities. In our view a China-centric commodities hedge should be concentrated in the industrial commodity complex. As the feedstock for China’s FAI boom, this is the sector most sensitive to mainland demand in both stock terms (China currently comprises about 10% of world oil demand, but 30-50% of industrial metal demand, Figure 24), and especially in flow terms (above 60% for iron ore, copper and aluminum, Figure 25). As some investors may not like to assume the implicit long \$USD exposure inherent in a blanket short commodity position, an appealing alternative may be to spreading a short base metal position against a long in gold, agriculture and oil<sup>38</sup>. Not only did this trade work well in the global growth downturn in 2008, but a short base/long gold and oil position also does double duty as a broad geopolitical hedge – a constant source of tail-risk to portfolios.

**Figure 24: Chinese consumption of industrial metals as a % of world demand**



Source: Deutsche Bank, CEIC, Brook Hunt

<sup>38</sup> China’s enormous and growing structural energy shortfall makes us somewhat resistant to recommend short oil, among a host of other factors.

**Figure 25: Contribution of Chinese commodity demand to world demand in 2011 (%)**

Source: Deutsche Bank

**A Final Word**

The broader discussion around fragility in China is attracting increasingly divergent views. We are however somewhat skeptical of the most extreme positions staked out by both sides of the debate, and as such, recommend a strong value bias in conducting hedging strategies. In that spirit, we conclude with a prescient passage from the FT's Chief Foreign Affairs analyst, Gideon Rachman<sup>39</sup>,

*"If and when China hits an economic and political crisis, the western narrative about China will change abruptly. Some will argue that the "China miracle" of the past 30 years was a mirage. But that, too, will be wrong. The debate about the future of China is in danger of becoming pointlessly polarised. One camp argues that China is the world's emerging superpower. The other insists that China is an intrinsically unstable country, at risk of an economic and political crisis. In fact, both ideas are true. China will be a strange superpower".*

**Brad Jones****Macro Investment Strategist**


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<sup>39</sup> "When China Becomes Number One", Financial Times, 6 June 2011.

# Appendix 1

## Important Disclosures

Additional information available upon request

For disclosures pertaining to recommendations or estimates made on a security mentioned in this report, please see the most recently published company report or visit our global disclosure look-up page on our website at <http://gm.db.com/ger/disclosure/DisclosureDirectory.eqsr>.

## Analyst Certification

The views expressed in this report accurately reflect the personal views of the undersigned lead analyst(s). In addition, the undersigned lead analyst(s) has not and will not receive any compensation for providing a specific recommendation or view in this report. Brad Jones

Equity rating key Equity rating dispersion and banking relationships

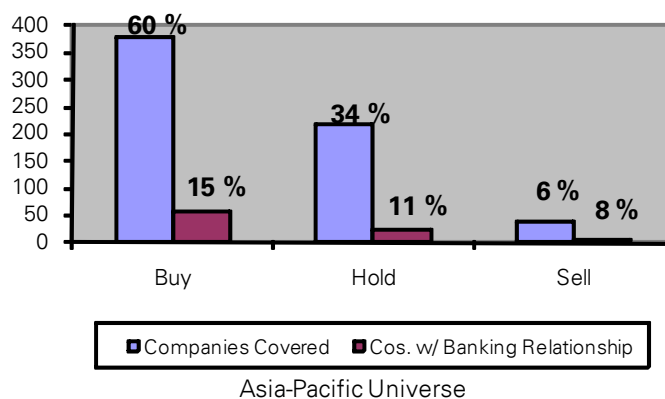
**Buy:** Based on a current 12-month view of total shareholder return (TSR = percentage change in share price from current price to projected target price plus projected dividend yield), we recommend that investors buy the stock.

**Sell:** Based on a current 12-month view of total shareholder return, we recommend that investors sell the stock

**Hold:** We take a neutral view on the stock 12-months out and, based on this time horizon, do not recommend either a Buy or Sell.

**Notes:**

1. Newly issued research recommendations and target prices always supersede previously published research.
2. Ratings definitions prior to 27 January, 2007 were:
  - Buy: Expected total return (including dividends) of 10% or more over a 12-month period
  - Hold: Expected total return (including dividends) between -10% and 10% over a 12-month period
  - Sell: Expected total return (including dividends) of -10% or worse over a 12-month period





## Regulatory Disclosures

### 1. Important Additional Conflict Disclosures

Aside from within this report, important conflict disclosures can also be found at <https://gm.db.com/equities> under the "Disclosures Lookup" and "Legal" tabs. Investors are strongly encouraged to review this information before investing.

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