CREDIT SUISSE

Long Run Commodity Prices: Where Do We Stand?

Commodities Research

Research Analysts
Ric Deverell
Director
+44 20 7883 2523
ric.deverell@credit-suisse.com

Martin Yu
Analyst
+ 44 20 7883 2150
martin.yu@credit-suisse.com

Over the past couple of years commodities have performed strongly, with the Credit Suisse Commodities Benchmark Index increasing 80% from its early 2009 low point. Given the magnitude of the rebound, many investors have begun to question whether prices have overshot. As part of our efforts to assess current price levels in this note we analyze real prices against very long-run patterns. We find that:

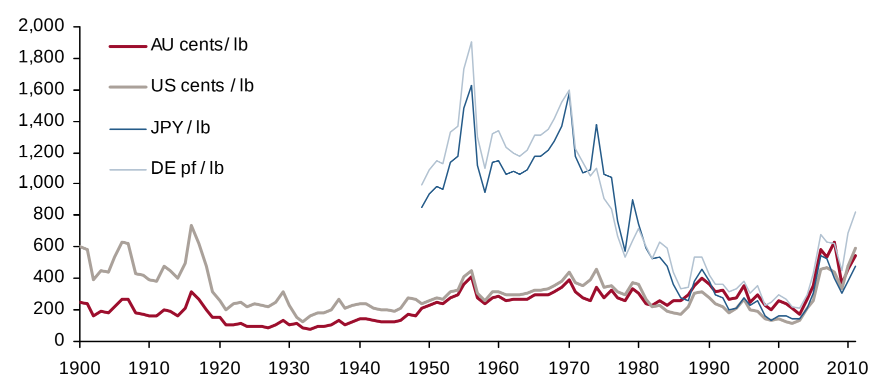
- On average real base metal prices have returned toward the top of the 110-year range, after a period of unusually weak prices over the 1980s and 1990s. However, on average they remain well below the level seen in the second half of the 19th century. The current rally has been the sharpest in history, but has to-date been considerably shorter than previous periods of relative scarcity, possibly suggesting that it may have further to run.
- Oil, iron ore and gold prices are currently around the highest level seen in the past 110 years, and are well above historical averages.
- In contrast, real grain prices remain low relative to the average since 1850.

While this analysis follows the standard approach of pricing commodities in US dollars (deflated by the US CPI), it is notable that over the longer run the choice of currency matters significantly. For example, in Deutschmarks (euro) and yen – currencies that appreciated significantly after the breakdown of the Bretton Woods system – real copper prices remain below average (Exhibit 1).

Further to this, many analysts have suggested that additional increases in Chinese (emerging market) commodity demand over coming years will effectively put a cap on consumption as high prices make commodities unaffordable ("China will turn its terms of trade against itself"). However, this argument does not account for the likelihood that the Chinese RMB will follow a similar path to the Japanese yen over coming decades. If this occurs, (as we expect) it will significantly increase China's purchasing power, potentially with significant implications for commodity prices in other currencies.

Exhibit 1: Copper in Different Currencies

US prices, deflated by US CPI then converted to different currencies, including data for 1H 2011



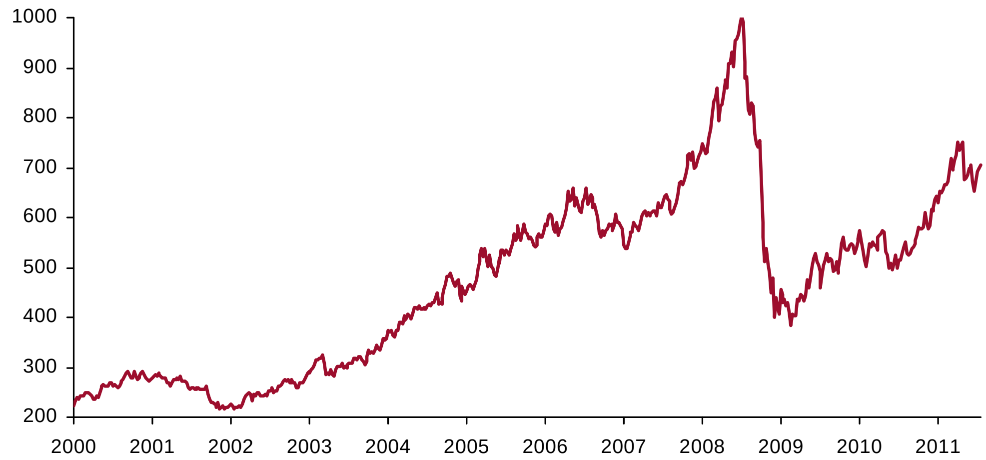
Source: the BLOOMBERG PROFESSIONAL™ service, IMF, Credit Suisse

Background

Over the past decade commodities have performed strongly, with the Credit Suisse Commodities Benchmark Index increasing 210%, about 10.3% per year since the beginning of 2000 (and 80% from its early 2009 low point). Given the magnitude of the increases, many investors have begun to question whether prices have overshot.

Exhibit 2: The Credit Suisse Commodities Benchmark has risen 210% since 2000

Index level since 2000



Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

In our 13 January 2011 report, *A Macroeconomic Proxy for Basic Materials Demand*, we argue that much of the increase in commodity prices has been due to very strong commodity demand. As a complement to that analysis, this note assess prices against very long-run patterns, in an effort to establish where current prices are relative to the historical experience.

While many economists and commentators have suggested that despite short-run volatility, over time commodity prices tend to fall[1], our analysis suggests that other than for agricultural products, most commodities do not have a clear long-run trend (up or down) with most effectively moving around a relatively consistent average over the past 110 years. Given the differences, to understand how recent movements fit within longer-run dynamics it is necessary to analyze each of the individual commodities.

Base Metals and Iron Ore

In this section we assess developments in the real price of base metals (namely, copper, aluminum, nickel, lead, zinc and tin) and iron ore. To this end it is notable that in the October 2010 World Economic Outlook (*Recovery, Risk and Rebalancing*) the IMF published a detailed analysis of long-run base metal prices. The IMF noted that while over the very long run Hotelling (1931) is likely to be right in his assumption that the price of non-renewable resources should reflect the marginal cost of extraction, in the short to medium term changes in the supply and demand balance can mean that prices move well beyond the cost curve for a sustained period. The IMF concludes that “the underlying causes of these super cycles are the long implementation lags for discovery, exploration, and capital investment in minerals industries, rather than true long-term scarcity. For example, for base metals, the average time needed to confirm a discovery following initial

1 This view is most clearly established with the academic economists Prebish and Singer, who in the 1950s argued that the price of commodities relative to that of manufactured goods will tend to decline over time.

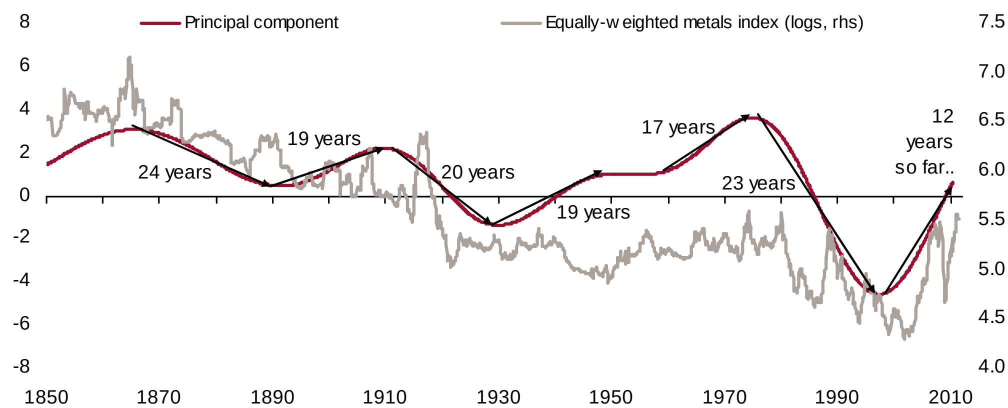
exploration can be as long as 20 years, with the average time to production around nine years. The sluggish supply response to shifts in demand can then give rise to price cycles with a longer duration than the typical two- to eight-year business cycle".

The IMF poses the question, does the evidence of increased scarcity mean that the demand-supply balance will require even higher prices in the future? It concludes that *"the measure of scarcity used in this analysis suggests that base metal prices are only about halfway through the current period of trend price increases*. On average since 1850, the common factor in the long-term component of metal prices has taken about 20 years to move from trough to peak [as highlighted by the first principal component in Exhibit 3), although the duration of these upturns varies and depends on the pace of technological innovation. Until now, there have been few convincing signs of a persistent increase in the growth of metal supply, and an ongoing global recovery will preclude a strong offset from cyclical factors. This would mean that, *if demand continues to grow at the rates observed over the past decade, the current era of higher scarcity, rising metal price trends, and a balance of price risks tilted toward the upside may continue for some time*."

This analysis is particularly interesting given that on average real base metal prices have returned close to the levels last seen in the 1970s, and before that the early part of the 20th century, 30% above the average since 1900. However, we note that this is still 60% below the level that prevailed in the 1850s.

Exhibit 3: Average Real Base Metal Prices

Log scale, Credit Suisse estimates after May 2010



Source: the BLOOMBERG PROFESSIONAL™ service, IMF, London Metal Exchange, Credit Suisse estimates

The following section adds to the IMF analysis by tracing movements in individual base metal prices, noting that while there are clear commonalities, there are also significant variations.[2]

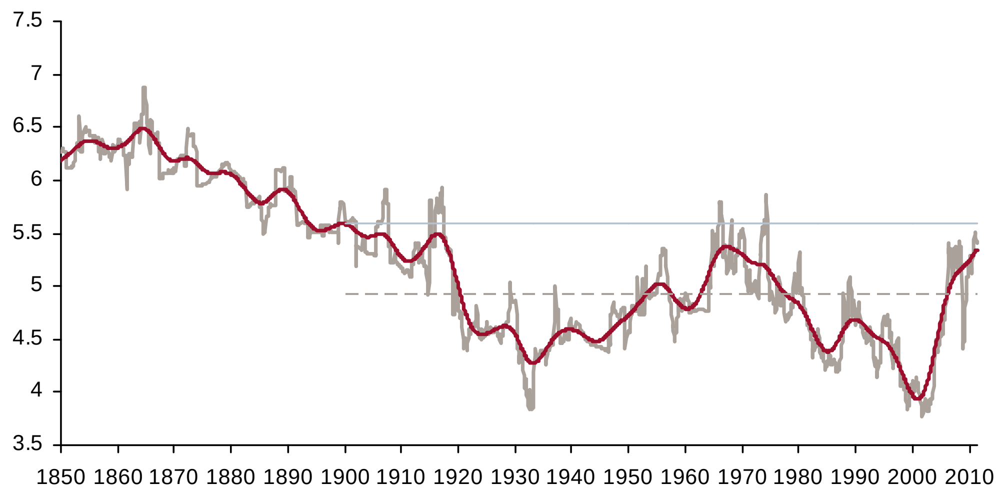
Copper

Over the past 160 years real copper prices have moved between \$1,700 and \$38,200 per metric ton in 2010 prices. The current price of around \$9,700 is around 80% above the 110-year average, but around a third below the peaks seen in the 1970s, and the first couple of decades of the 20th century. It is around 50% below the price in 1850.

[2] The following charts are in natural logs and make use of monthly prices deflated by the US CPI compiled from Global Financial Data and the International Monetary Fund. Updates to the data were obtained from the London Metal Exchange and the BLOOMBERG PROFESSIONAL™ service. Trends in each chart is calculated using the Hodrick-Prescott filter.

Exhibit 4: Real Copper Prices

Deflated by US CPI, log scale with average, HP filter trend and 2 standard deviation limits, data till June 2011



Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

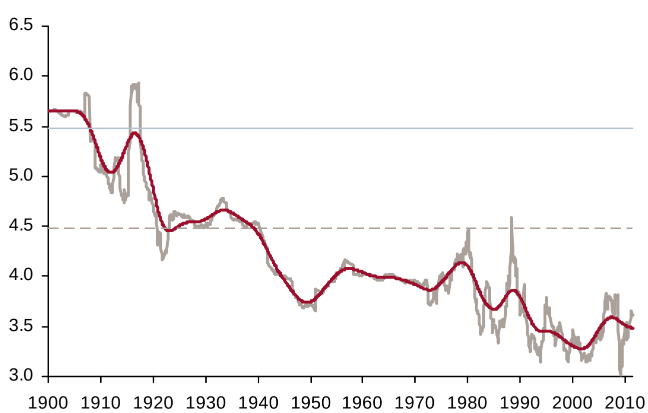
Aluminum and Nickel

Aluminum stands out amongst the base metals. Since the early 1900s, real prices have continuously trended lower, reflecting the impact of rapid technological change as aluminium moved from being effectively a precious metal to a core industrial commodity. Despite the rally over the past decade present aluminum prices at $2,600 are still about 55% below the 110-year average.

Nickel, on the other hand, had more well-defined trends, similar to those of copper, with the majority of peaks and troughs corresponding well with copper's peak and troughs, although the degree of movement varied widely. Real nickel prices today at $24,000 are 75% above the 110-year average, but still a little below the peak in the late 1970s.

Exhibit 5: Real Aluminum Prices

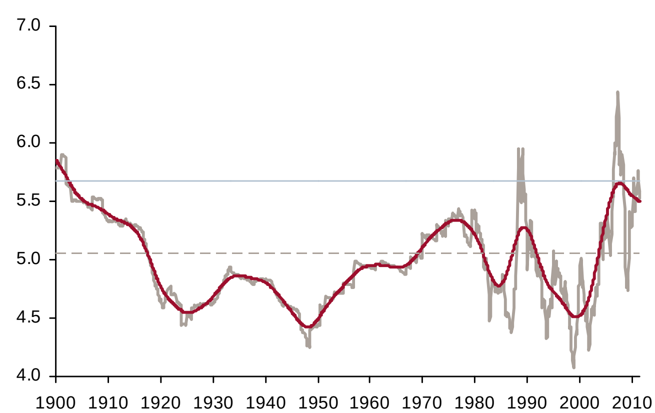
Deflated by US CPI, log scale with average, HP filter trend & 2 std dev limits



Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Exhibit 6: Real Nickel Prices

Deflated by US CPI, log scale with average, HP filter trend & 2 std dev limits



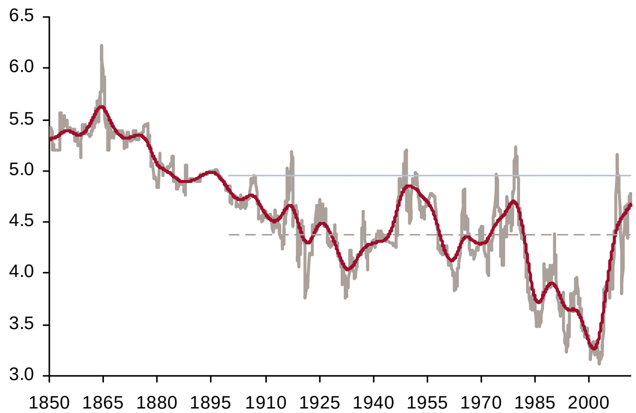
Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Lead and Zinc

Lead and zinc are also interesting, as they are often produced from the same ore bodies. As such, some trends were quite similar, but different uses for metals meant that the scale in price movements were very different. At current levels, lead prices are 45% above the 110-year average, while zinc prices at $2,400 are 15% above average.

Exhibit 7: Real Lead Prices

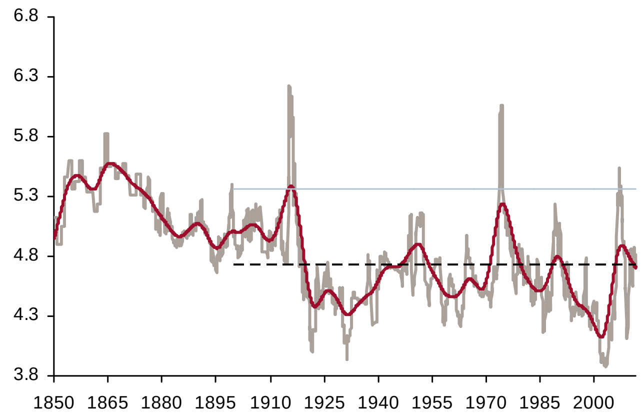
Deflated by US CPI, log scale with average, HP filter trend & 2 std dev limits



Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Exhibit 8: Real Zinc Prices

Deflated by US CPI, log scale with average, HP filter trend & 2 std dev limits



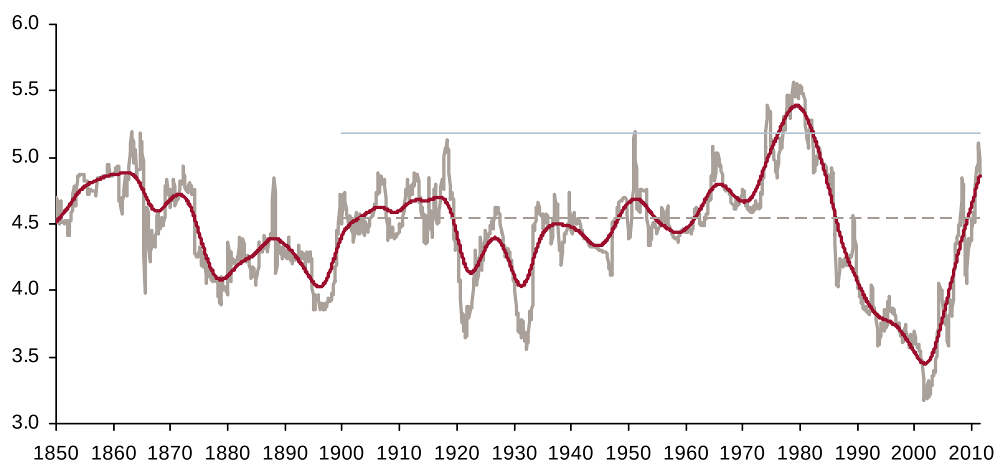
Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Tin

Movements in tin prices were unique amongst base metals with price manipulation a key factor at various times. At current levels of around $27,000 per metric ton, real tin prices are 50% above the 110-year average.

Exhibit 9: Real Tin Prices

Deflated by US CPI, log scale with average, HP filter trend and 2 standard deviation limits, data till June 2011



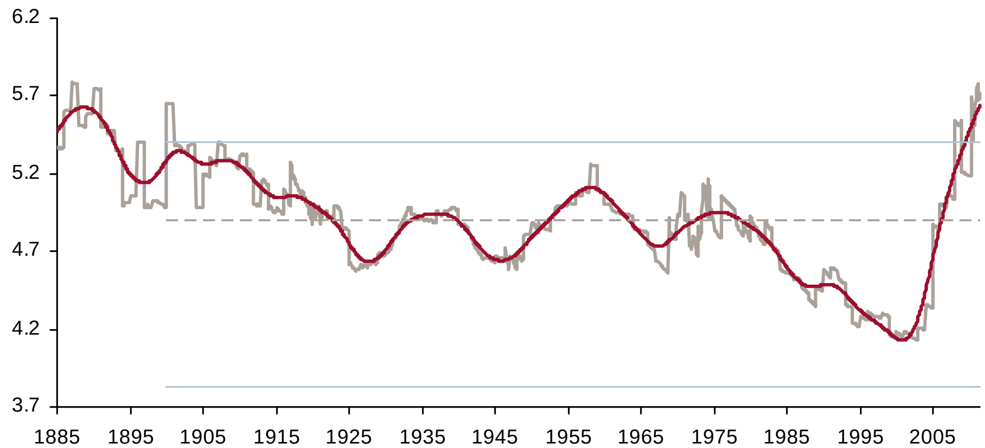
Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Iron Ore

Although iron ore is not a base metal, it is also leveraged to the industrial and construction cycle. As such, one would expect similar pricing dynamics between iron ore and other metals. However, this has not been the case, with the surge in Chinese steel production over the past decade moving the real iron ore price to historical highs. At the current level of around $175 per metric ton, prices are over 120% above the 110-year average, and the highest level on record.

Exhibit 10: Real Iron Ore Prices

Deflated by US CPI, log scale with average, HP filter trend and 2 standard deviation limits, data till June 2011



Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Other Commodities

We also assess developments in other commodities such as crude oil, thermal coal, gold and grains to compare how prices have moved compared over the long run. As expected, grain prices have not tracked prices of other commodities, which is not surprising given that they are not driven by the industrial cycle. However, interestingly we note the similarity in gold and oil prices – a reflection of their event driven fundamentals.

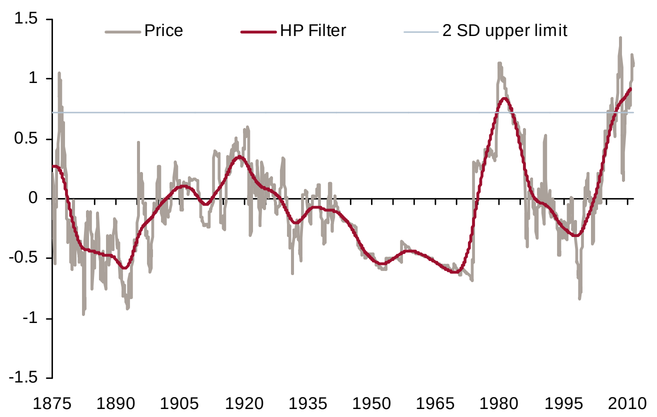
Energy

The IMF analyzed the effects of long-run energy scarcity on the oil price in its April 2011 World Economic Outlook (*Tensions from the Two-Speed Recovery*). The IMF notes that "*real oil (and coal) prices have not trended persistently up or down throughout the sample period. Instead, prices have experienced slow-moving fluctuations around long-term averages* which suggest *that periods of changing oil scarcity have been long-lasting but have come to an end, and that investment, technology, and discovery are eventually responsive to price signals.*"

Notably, in real terms the price of oil is currently near its historical high, with the only other spike close to the current level (in the 1970s) relatively short-lived – although it is notable that on that occasion the proximate cause was a supply disruption rather than an increase in demand which has been the primary factor this decade. Similarly, thermal coal prices are also currently near historically high levels.

Exhibit 11: Long-run crude oil prices and trend

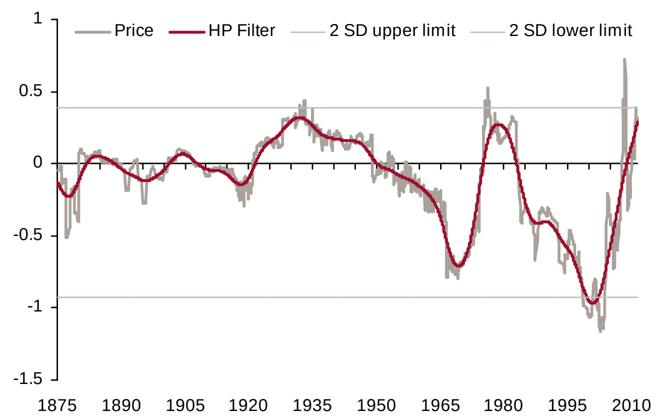
Deflated by US CPI, log scale around long run average, data till June 2011



Source: GFD, IMF, Credit Suisse

Exhibit 12: Long-run coal prices and trend

Deflated by US CPI, log scale around long run average, data till June 2011



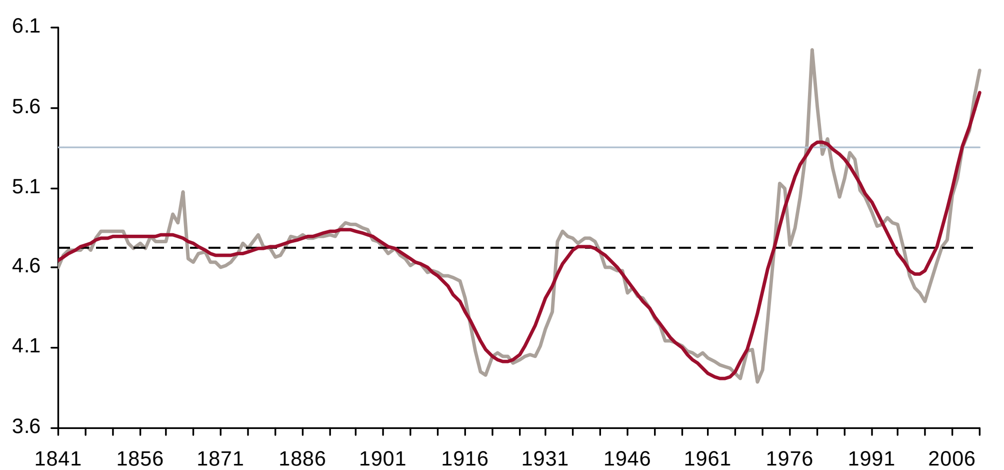
Source: the BLOOMBERG PROFESSIONAL™ service, GFD, IMF, Credit Suisse

Gold

Like crude oil, the real price of gold has not exhibited a clear trend over the past 170 years, with prices relatively stable for much of that period – noting that for long periods such as during the gold standard and during the Bretton Woods era the price of gold was tightly regulated. Notably, the only spike that was comparable to the current rally followed the breakdown of the Bretton Woods system of currency fixes, but was relatively short-lived. The real price of gold is currently around 200% above the long-run average.

Exhibit 13: Gold has risen multiple standard deviations above average

Deflated by US CPI, log scale with 2 standard deviation upper limit and HP filter trend, data up to 1H 2011, annual data



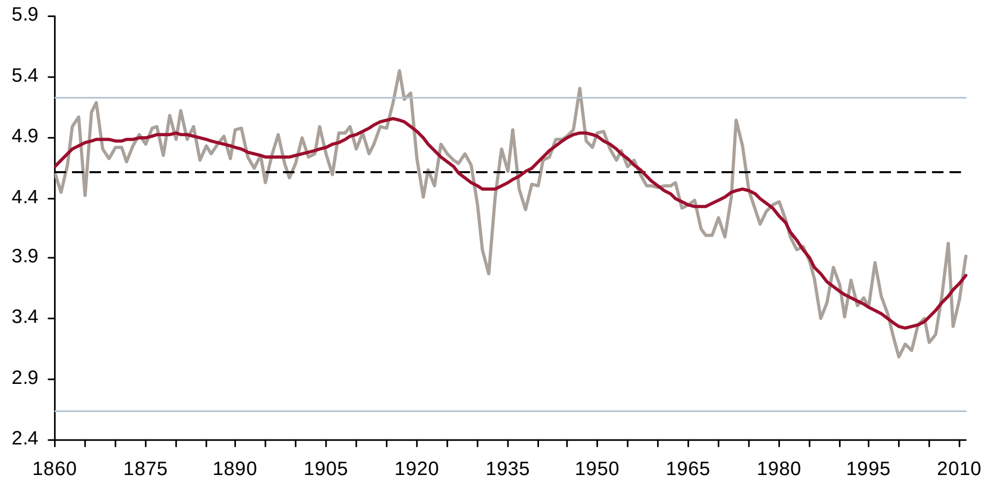
Source: Thomson Reuters DataStream, GFD, Credit Suisse

Grains

Grain prices (as estimated by the simple average of corn and wheat prices) have exhibited characteristics quite different from those of all other commodities. After a period of relative stability in the 100 years up to 1950, real prices declined by 85% in the 50 years to 2000, before stabilizing and trending up a little over the past decade. In real terms grain prices remain around 50% below the long-run average.

Exhibit 14: Grain prices remain well below their long-run average

Deflated by US CPI, log scale with 2 standard deviation limits and HP filter trend, data up to 1H 2011, annual data



Source: the BLOOMBERG PROFESSIONAL™ service, GFD, Credit Suisse

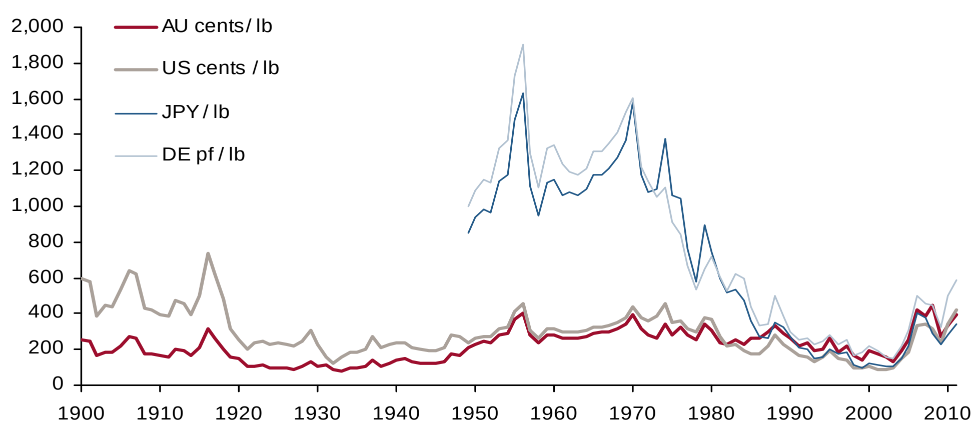
The Choice of Currency Matters

While the above analysis follows the standard approach in the literature of comparing long-run US dollar prices (in this instance deflated by the US CPI), we note that the choice of currency over time has significant implications for how prices are viewed relative to history.

Using copper as an example, while in dollar terms real copper prices have been relatively stable over the past 110 years (relative being the operative term as the price has moved in a range between $1,900 and $16,200 dollars in today's prices), in Japanese yen and Deutschmark (currencies that appreciated significantly following the breakdown of the Breton Woods system), the current level of copper prices is significantly below that seen in the 1960s (Exhibit 15).

Exhibit 15: Currency appreciation significantly affected copper prices

US cents per lb, deflated by US CPI then converted to different currencies, including data for 1H 2011, annual data



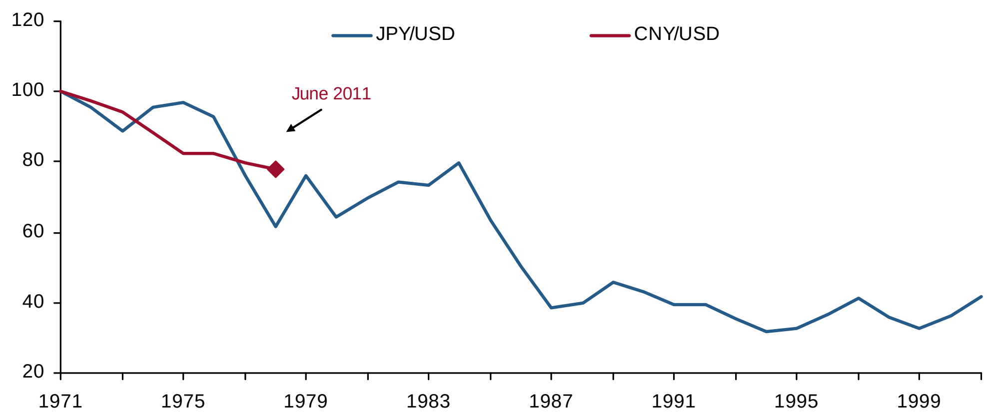
Source: the BLOOMBERG PROFESSIONAL™ service, IMF, GFD, Credit Suisse

Japan and Germany are clear examples of how significant moves in currencies can have a profound impact on a country's purchasing power in raw material markets. In effect, both countries were able to import more raw materials at a cheaper price over time as their currencies went up. This has far-reaching implications for China which has only recently embarked on the path of currency appreciation.

While many have criticized China for the slow pace of adjustment, it is notable that so far the Chinese seem to be following a very similar path to that of the Japanese yen in the 1970s, 1980s and 1990s, when the yen appreciated by an average of about 4.5% per year between the breakdown of the Bretton Woods fix in 1971 and its peak in 1995.

Exhibit 16: RMB appreciating at the same pace as the yen post-Bretton Woods

Index RMB 2004 = 100, JPY 1971 = 100, annual data



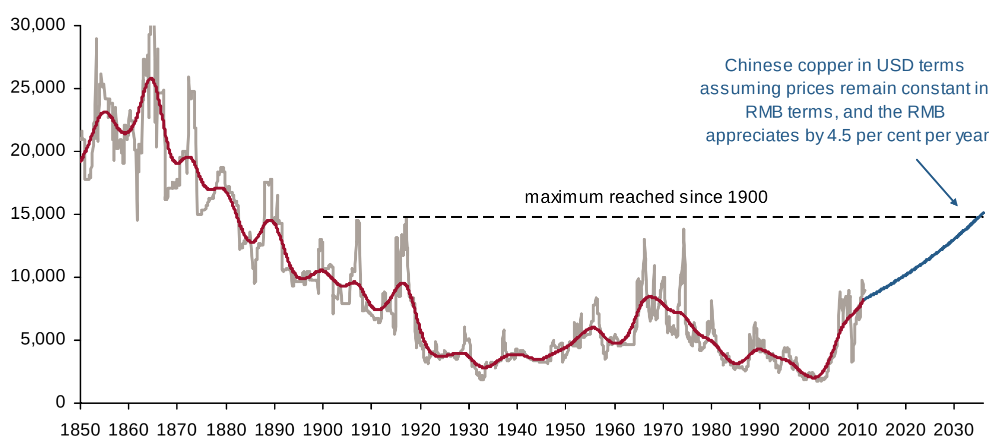
Source: the BLOOMBERG PROFESSIONAL™ service, Credit Suisse

It is impossible to say with any precision exactly what path the RMB will follow, but what is clear is that China has the capacity to act against any negative implications from the deterioration in its terms of trade. Or to put it another way, the Chinese can significantly increase their purchasing power in commodity markets by allowing their currency to appreciate.

For example, should the RMB continue along the path of the yen's appreciation (a highly probably scenario in our view), assuming a constant copper price in RMB terms, the price of copper would increase more than 60% in real USD terms over the next 25 years, or in current dollar terms to around $15,000 (Exhibit 17).

Exhibit 17: Real US $ price of copper assuming constant RMB price and RMB appreciation

US dollars per metric ton, deflated by US CPI, projection (grey line), assuming projected CPI of 2%



Source: the BLOOMBERG PROFESSIONAL™ service, IMF, GFD, Credit Suisse

CREDIT SUISSE

GLOBAL COMMODITIES RESEARCH

Ric Deverell, Director
Group Head
+44 20 7883 2523
ric.deverell@credit-suisse.com

Eric Miller, Managing Director
Global Head of Fixed Income and Economic Research
+1 212 538 6480
eric.miller.3@credit-suisse.com

LONDON

Ric Deverell, Director
Group Head
+44 20 7883 2523
ric.deverell@credit-suisse.com

Tom Kendall, Vice President
+44 20 7883 2432
tom.kendall@credit-suisse.com

Martin Yu, Analyst
+44 20 7883 2150
martin.yu@credit-suisse.com

NORTH AMERICA

Joachim Azria, Associate
+1 212 325 4556
joachim.azria@credit-suisse.com

Stefan Revielle, Associate
+1 212 538 6802
stefan.revielle@credit-suisse.com

Ivan Szpakowski, Associate
+1 212 325 6154
ivan.szpakowski@credit-suisse.com

TECHNICAL ANALYSIS

Christopher Hine, Vice President
+1 212 538 5727
christopher.hine@credit-suisse.com

CREDIT SUISSE

Disclosure Appendix

Analyst Certification

Ric Deverell and Martin Yu each certify, with respect to the companies or securities that he or she analyzes, that (1) the views expressed in this report accurately reflect his or her personal views about all of the subject companies and securities and (2) no part of his or her compensation was, is or will be directly or indirectly related to the specific recommendations or views expressed in this report.

Important Disclosures

Credit Suisse's policy is only to publish investment research that is impartial, independent, clear, fair and not misleading. For more detail, please refer to Credit Suisse's Policies for Managing Conflicts of Interest in connection with Investment Research: http://www.csfb.com/research-and-analytics/disclaimer/managing_conflicts_disclaimer.html

Credit Suisse's policy is to publish research reports as it deems appropriate, based on developments with the subject issuer, the sector or the market that may have a material impact on the research views or opinions stated herein.

The analyst(s) involved in the preparation of this research report received compensation that is based upon various factors, including Credit Suisse's total revenues, a portion of which are generated by Credit Suisse's Investment Banking and Fixed Income Divisions.

Credit Suisse may trade as principal in the securities or derivatives of the issuers that are the subject of this report.

At any point in time, Credit Suisse is likely to have significant holdings in the securities mentioned in this report.

As at the date of this report, Credit Suisse acts as a market maker or liquidity provider in the debt securities of the subject issuer(s) mentioned in this report.

For important disclosure information on securities recommended in this report, please visit the website at https://firesearchdisclosure.credit-suisse.com or call +1-212-538-7625.

For the history of any relative value trade ideas suggested by the Fixed Income research department as well as fundamental recommendations provided by the Emerging Markets Sovereign Strategy Group over the previous 12 months, please view the document at http://research-and-analytics.csfb.com/docpopup.asp?ctbdocid=330703_1_en. Credit Suisse clients with access to the Locus website may refer to http://www.credit-suisse.com/locus.

For the history of recommendations provided by Technical Analysis, please visit the website at http://www.credit-suisse.com/techanalysis.

Credit Suisse does not provide any tax advice. Any statement herein regarding any US federal tax is not intended or written to be used, and cannot be used, by any taxpayer for the purposes of avoiding any penalties.

Emerging Markets Bond Recommendation Definitions

Buy: Indicates a recommended buy on our expectation that the issue will deliver a return higher than the risk-free rate.
Sell: Indicates a recommended sell on our expectation that the issue will deliver a return lower than the risk-free rate.

Corporate Bond Fundamental Recommendation Definitions

Buy: Indicates a recommended buy on our expectation that the issue will be a top performer in its sector.
Outperform: Indicates an above-average total return performer within its sector. Bonds in this category have stable or improving credit profiles and are undervalued, or they may be weaker credits that, we believe, are cheap relative to the sector and are expected to outperform on a total-return basis. These bonds may possess price risk in a volatile environment.
Market Perform: Indicates a bond that is expected to return average performance in its sector.
Underperform: Indicates a below-average total-return performer within its sector. Bonds in this category have weak or worsening credit trends, or they may be stable credits that, we believe, are overvalued or rich relative to the sector.
Sell: Indicates a recommended sell on the expectation that the issue will be among the poor performers in its sector.
Restricted: In certain circumstances, Credit Suisse policy and/or applicable law and regulations preclude certain types of communications, including an investment recommendation, during the course of Credit Suisse's engagement in an investment banking transaction and in certain other circumstances.
Not Rated: Credit Suisse Global Credit Research or Global Leveraged Finance Research covers the issuer but currently does not offer an investment view on the subject issue.
Not Covered: Neither Credit Suisse Global Credit Research nor Global Leveraged Finance Research covers the issuer or offers an investment view on the issuer or any securities related to it. Any communication from Research on securities or companies that Credit Suisse does not cover is factual or a reasonable, non-material deduction based on an analysis of publicly available information.

Corporate Bond Risk Category Definitions

In addition to the recommendation, each issue may have a risk category indicating that it is an appropriate holding for an "average" high yield investor, designated as **Market**, or that it has a higher or lower risk profile, designated as **Speculative** and **Conservative**, respectively.

Credit Suisse Credit Rating Definitions

Credit Suisse may assign rating opinions to investment-grade and crossover issuers. Ratings are based on our assessment of a company's creditworthiness and are not recommendations to buy or sell a security. The ratings scale (AAA, AA, A, BBB, BB, B) is dependent on our assessment of an issuer's ability to meet its financial commitments in a timely manner. Within each category, creditworthiness is further detailed with a scale of High, Mid, or Low – with High being the strongest sub-category rating: **High AAA, Mid AAA, Low AAA** – obligor's capacity to meet its financial commitments is extremely strong; **High AA, Mid AA, Low AA** – obligor's capacity to meet its financial commitments is very strong; **High A, Mid A, Low A** – obligor's capacity to meet its financial commitments is strong; **High BBB, Mid BBB, Low BBB** – obligor's capacity to meet its financial commitments is adequate, but adverse economic/operating/financial circumstances are more likely to lead to a weakened capacity to meet its obligations; **High BB, Mid BB, Low BB** – obligations have speculative characteristics and are subject to substantial credit risk; **High B, Mid B, Low B** – obligor's capacity to meet its financial commitments is very weak and highly vulnerable to adverse economic, operating, and financial circumstances; **High CCC, Mid CCC, Low CCC** – obligor's capacity to meet its financial commitments is extremely weak and is dependent on favorable economic, operating, and financial circumstances. Credit Suisse's rating opinions do not necessarily correlate with those of the rating agencies.

References in this report to Credit Suisse include all of the subsidiaries and affiliates of Credit Suisse AG operating under its investment banking division. For more information on our structure, please use the following link: https://www.credit-suisse.com/who_we_are/en/.

This report is not directed to, or intended for distribution to or use by, any person or entity who is a citizen or resident of or located in any locality, state, country or other jurisdiction where such distribution, publication, availability or use would be contrary to law or regulation or which would subject Credit Suisse AG or its affiliates ("CS") to any registration or licensing requirement within such jurisdiction. All material presented in this report, unless specifically indicated otherwise, is under copyright to CS. None of the material, nor its content, nor any copy of it, may be altered in any way, transmitted to, copied or distributed to any other party, without the prior express written permission of CS. All trademarks, service marks and logos used in this report are trademarks or service marks or registered trademarks or service marks of CS or its affiliates.

The information, tools and material presented in this report are provided to you for information purposes only and are not to be used or considered as an offer or the solicitation of an offer to sell or to buy or subscribe for securities or other financial instruments. CS may not have taken any steps to ensure that the securities referred to in this report are suitable for any particular investor. CS will not treat recipients of this report as its customers by virtue of their receiving this report. The investments and services contained or referred to in this report may not be suitable for you and it is recommended that you consult an independent investment advisor if you are in doubt about such investments or investment services. Nothing in this report constitutes investment, legal, accounting or tax advice, or a representation that any investment or strategy is suitable or appropriate to your individual circumstances, or otherwise constitutes a personal recommendation to you. CS does not advise on the tax consequences of investments and you are advised to contact an independent tax adviser. Please note in particular that the bases and levels of taxation may change.

Information and opinions presented in this report have been obtained or derived from sources believed by CS to be reliable, but CS makes no representation as to their accuracy or completeness. CS accepts no liability for loss arising from the use of the material presented in this report, except that this exclusion of liability does not apply to the extent that such liability arises under specific statutes or regulations applicable to CS. This report is not to be relied upon in substitution for the exercise of independent judgment. CS may have issued, and may in the future issue, other reports that are inconsistent with, and reach different conclusions from, the information presented in this report. Those reports reflect the different assumptions, views and analytical methods of the analysts who prepared them and CS is under no obligation to ensure that such other reports are brought to the attention of any recipient of this report.

CS may, to the extent permitted by law, participate or invest in financing transactions with the issuer(s) of the securities referred to in this report, perform services for or solicit business from such issuers, and/or have a position or holding, or other material interest, or effect transactions, in such securities or options thereon, or other investments related thereto. In addition, it may make markets in the securities mentioned in the material presented in this report. CS may have, within the last three years, served as manager or co-manager of a public offering of securities for, or currently may make a primary market in issues of, any or all of the entities mentioned in this report or may be providing, or have provided within the previous 12 months, significant advice or investment services in relation to the investment concerned or a related investment. Additional information is, subject to duties of confidentiality, available on request. Some investments referred to in this report will be offered solely by a single entity and in the case of some investments solely by CS, or an associate of CS or CS may be the only market maker in such investments.

Past performance should not be taken as an indication or guarantee of future performance, and no representation or warranty, express or implied, is made regarding future performance. Information, opinions and estimates contained in this report reflect a judgement at its original date of publication by CS and are subject to change without notice. The price, value of and income from any of the securities or financial instruments mentioned in this report can fall as well as rise. The value of securities and financial instruments is subject to exchange rate fluctuation that may have a positive or adverse effect on the price or income of such securities or financial instruments. Investors in securities such as ADR's, the values of which are influenced by currency volatility, effectively assume this risk.

Structured securities are complex instruments, typically involve a high degree of risk and are intended for sale only to sophisticated investors who are capable of understanding and assuming the risks involved. The market value of any structured security may be affected by changes in economic, financial and political factors (including, but not limited to, spot and forward interest and exchange rates), time to maturity, market conditions and volatility, and the credit quality of any issuer or reference issuer. Any investor interested in purchasing a structured product should conduct their own investigation and analysis of the product and consult with their own professional advisers as to the risks involved in making such a purchase.

Some investments discussed in this report may have a high level of volatility. High volatility investments may experience sudden and large falls in their value causing losses when that investment is realised. Those losses may equal your original investment. Indeed, in the case of some investments the potential losses may exceed the amount of initial investment and, in such circumstances, you may be required to pay more money to support those losses. Income yields from investments may fluctuate and, in consequence, initial capital paid to make the investment may be used as part of that income yield. Some investments may not be readily realisable and it may be difficult to sell or realise those investments, similarly it may prove difficult for you to obtain reliable information about the value, or risks, to which such an investment is exposed.

This report may provide the addresses of, or contain hyperlinks to, websites. Except to the extent to which the report refers to website material of CS, CS has not reviewed any such site and takes no responsibility for the content contained therein. Such address or hyperlink (including addresses or hyperlinks to CS's own website material) is provided solely for your convenience and information and the content of any such website does not in any way form part of this document. Accessing such website or following such link through this report or CS's website shall be at your own risk.

This report is issued and distributed in Europe (except Switzerland) by Credit Suisse Securities (Europe) Limited, One Cabot Square, London E14 4QJ, England, which is regulated in the United Kingdom by The Financial Services Authority ("FSA"). This report is being distributed in Germany by Credit Suisse Securities (Europe) Limited Niederlassung Frankfurt am Main regulated by the Bundesanstalt fuer Finanzdienstleistungsaufsicht ("BaFin"). This report is being distributed in the United States and Canada by Credit Suisse Securities (USA) LLC; in Switzerland by Credit Suisse AG; in Brazil by Banco de Investimentos Credit Suisse (Brasil) S.A; in Mexico by Banco Credit Suisse (México), S.A. (transactions related to the securities mentioned in this report will only be effected in compliance with applicable regulation); in Japan by Credit Suisse Securities (Japan) Limited, Financial Instruments Firm, Director-General of Kanto Local Finance Bureau (*Kinsho*) No. 66, a member of Japan Securities Dealers Association, The Financial Futures Association of Japan, Japan Securities Investment Advisers Association, Type II Financial Instruments Firms Association; elsewhere in Asia/ Pacific by whichever of the following is the appropriately authorised entity in the relevant jurisdiction: Credit Suisse (Hong Kong) Limited, Credit Suisse Equities (Australia) Limited, Credit Suisse Securities (Thailand) Limited, Credit Suisse Securities (Malaysia) Sdn Bhd, Credit Suisse AG, Singapore Branch, and elsewhere in the world by the relevant authorised affiliate of the above. Research on Taiwanese securities produced by Credit Suisse AG, Taipei Branch has been prepared by a registered Senior Business Person. Research provided to residents of Malaysia is authorised by the Head of Research for Credit Suisse Securities (Malaysia) Sdn Bhd, to whom they should direct any queries on +603 2723 2020. This research may not conform to Canadian disclosure requirements.

In jurisdictions where CS is not already registered or licensed to trade in securities, transactions will only be effected in accordance with applicable securities legislation, which will vary from jurisdiction to jurisdiction and may require that the trade be made in accordance with applicable exemptions from registration or licensing requirements. Non-U.S. customers wishing to effect a transaction should contact a CS entity in their local jurisdiction unless governing law permits otherwise. U.S. customers wishing to effect a transaction should do so only by contacting a representative at Credit Suisse Securities (USA) LLC in the U.S.

This material is not for distribution to retail clients and is directed exclusively at Credit Suisse's market professional and institutional clients. Recipients who are not market professional or institutional investor clients of CS should seek the advice of their independent financial advisor prior to taking any investment decision based on this report or for any necessary explanation of its contents. This research may relate to investments or services of a person outside of the UK or to other matters which are not regulated by the FSA or in respect of which the protections of the FSA for private customers and/or the UK compensation scheme may not be available, and further details as to where this may be the case are available upon request in respect of this report.

CS may provide various services to US municipal entities or obligated persons ("municipalities"), including suggesting individual transactions or trades and entering into such transactions. Any services CS provides to municipalities are not viewed as "advice" within the meaning of Section 975 of the Dodd-Frank Wall Street Reform and Consumer Protection Act. CS is providing any such services and related information solely on an arm's length basis and not as an advisor or fiduciary to the municipality. In connection with the provision of the any such services, there is no agreement, direct or indirect, between any municipality (including the officials, management, employees or agents thereof) and CS for CS to provide advice to the municipality. Municipalities should consult with their financial, accounting and legal advisors regarding any such services provided by CS. In addition, CS is not acting for direct or indirect compensation to solicit the municipality on behalf of an unaffiliated broker, dealer, municipal securities dealer, municipal advisor, or investment adviser for the purpose of obtaining or retaining an engagement by the municipality for or in connection with Municipal Financial Products, the issuance of municipal securities, or of an investment adviser to provide investment advisory services to or on behalf of the municipality.

Investment principal on bonds can be eroded depending on sale price or market price. In addition, there are bonds on which investment principal can be eroded due to changes in redemption amounts. Care is required when investing in such instruments.

When you purchase non-listed Japanese fixed income securities (Japanese government bonds, Japanese municipal bonds, Japanese government guaranteed bonds, Japanese corporate bonds) from CS as a seller, you will be requested to pay purchase price only.