

CUSP 2007

Quantitative Credit Strategy

Contributors

Helen Haworth
+44 20 8880 757
helen.haworth@credit-suisse.com

Richard Martin
+44 20 7888 4736
richard.martin@credit-suisse.com

User Information

This document is designed to provide an introduction to CUSP® for use in the investment decision making process. We provide an overview of the information given in the CUSP section of LOCuS – what it means and how it should be interpreted. The document is designed to be read in conjunction with CUSP 2007, Overview of our new Structural Model¹, and page references throughout refer to this booklet which contains significant additional information and full details of the model.

We begin with a quick summary of the main CUSP pages in LOCuS, and then provide a brief reminder of the underlying idea behind pricing in a structural framework, along with an explanation of the calibration inputs and outputs. We then address the definition and interpretation of the information given for each issuer.

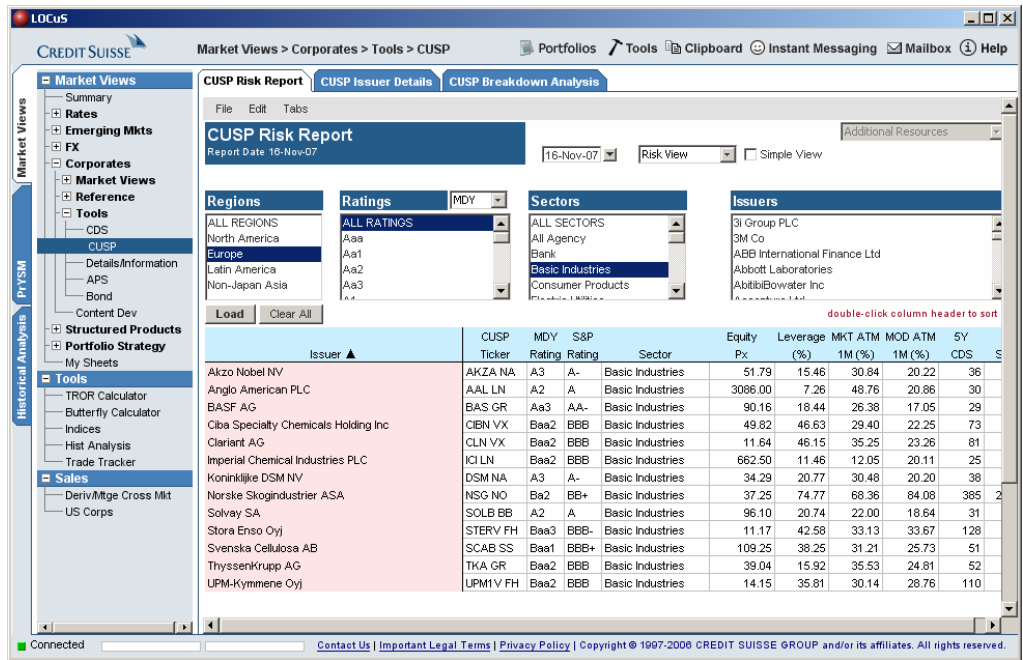
CUSP Pages in LOCuS

Exhibit 1 illustrates the CUSP Risk Report for the European Basic Industries sector. If the Simple View box on the top right is deselected, the entire range of market and model data is available for each issuer chosen. Issuers can be selected either individually using the Issuers drop-down box on the right, or by choosing a Region, Rating and/or Sector.

To see specific details for an individual issuer, either select the CUSP Issuer Details tab, illustrated in Exhibit 2, or alternatively, right click on the issuer of interest in the risk report and select “Send to CUSP Issuer Details”.

¹ CUSP 2007, Overview of our new Structural Model, 28 February 2007

Exhibit 1: CUSP Risk Report



Source: Credit Suisse

Exhibit 2: CUSP Issuer Details



Source: Credit Suisse

Contingent Claims Pricing

CUSP 2007 is a structural credit model, in the vein of the original model by Merton (1973), so both debt and equity can be modelled as contingent claims on the value of firm assets. Specifically, if F denotes debt face value,

- Equity = Call Option (on value of firm assets, strike F) (1)

- Debt = $F -$ Put Option (on value of firm assets, strike F) (2)

Written in this way, the importance of asset volatility is clearly highlighted. The greater the asset volatility, the more valuable the options and consequently the greater the value transferred from debt holders to equity holders. Further details are in CUSP 2007, page 6.

Calibration

Unlike traditional structural models, CUSP 2007 calibrates to the market CDS curve. The calibration inputs are 5 and 10 year CDS spreads (except for high spread names for which 2 year and 5 year spreads are used) and the ratio of debt to equity.

The outputs from the calibration are then the asset volatility, asset skew, and internal leverage. We define each in turn and discuss its interpretation. Further information regarding the sensitivity of spreads and curve shape to these parameters is given on pages 21-23 of CUSP 2007.

Asset Volatility

Asset volatility is one of three volatility measures considered in CUSP and as outlined in (1) and (2) above, is a crucial parameter to consider when deciding which part of the capital structure to trade, and when looking at capital-arbitrage trades. (Further details, pages 35-37).

For example, if you want to go long the firm, if asset volatility is low, you should buy equity; if it is high, you should sell CDS. This is because low asset volatility corresponds to the options in (1) and (2) being cheap and so equity is cheap and debt is expensive. Conversely, for high asset volatility, debt is cheap, equity expensive. In the CUSP Risk Report view (Exhibit 1), by sorting sector constituents by asset volatility (double click on the heading for that column) you can therefore gain additional relative value information to assist in deciding which names you want to be long, and which short. Two companies with similar profiles and in the same business should have similar asset volatilities.

Asset Skew

In CUSP 2007 firm value dynamics are driven by both diffusive and jump terms (the process is actually a geometric Levy process, see pages 15-16 for further details). Asset skew represents the proportion of the variation in the value of the firm that is explained by jumps.

- Low skew → small jump size → steep curve/low short spreads, low chance of immediate default
- High skew → large jump size → flatter curve and higher probability of immediate default.

Leverage

There are two definitions of leverage in CUSP 2007,

1. External leverage = debt/equity = $F/(F+E)$
2. Internal leverage = $F/(D+E) = F/A$

where F is debt face value, D is debt present value, and E is equity value. External leverage is used as an input to the calibration. Data are from HOLT and leverage is calculated as $(ST\ debt + LT\ debt)/(ST\ debt + LT\ debt + Nosh * Share\ price)$.

Financial Issuers

Structural models have traditionally tended to struggle with valuing financial issuers due to their high leverage and low asset volatility. This isn't the case for CUSP 2007, which produces good results for all issuers due to the presence of the asset skew parameter (see page 24). Leverage is calculated by removing any liabilities more senior than those in which we are interested, effectively meaning that the deposit base is excluded (see page 26), and CUSP is able to value both senior and subordinated debt (although the latter is not included in the LOCuS sheet).

Off-Balance Sheet Debt

Off-balance sheet debt is not explicitly included in CUSP, however, it is accounted for through the asset volatility. The more off-B/S debt a firm has, the more volatile its assets and, therefore, the greater the value that is transferred from debt holders to equity holders. This only holds for that off-B/S debt known to the market and, therefore, if one believes that a company has more off-B/S debt than is generally known, asset volatility should be higher than it actually is, and so the trade is to buy CDS, buy equity. (Since from (1) and (2), an increase in asset volatility increases equity value and reduces debt value.)

Volatility

There are three different volatility measures used in CUSP

1. Asset volatility – from the calibration of the CDS curve; a key model parameter as outlined above
 2. MOD ATM 1M (%) – model implied 1 month ATM option volatility
 3. MKT ATM 1M (%) – market 1 month ATM option volatility
3. comes directly from market option prices whilst 2. is the implied ATM option volatility inherent in the model – after calibrating the model to the CDS curve and debt to equity ratio to get the asset volatility etc., we calculate values for the debt, equity and equity options to compile an equity vol-surface (further information, page 18). Equity option volatility is then used in two ways – in the calculation of SWR and IRD, and in the derivation of the volatility implied curve (VIC).

VIC

Higher equity volatility tends to go hand in hand with a steeper CDS curve (see pages 33 - 34 for further details). By comparing model-implied equity volatility with the market level, it is therefore possible to take a view on current curve steepness versus equity volatility.

This relationship can be seen by selecting the VIC View for an issuer in the CUSP Issuer Details tab (drop down box top right), as shown for DSGILN in Exhibit 3. By calibrating to five year CDS spreads and 1M ATM equity volatility, CUSP calculates the “volatility implied curve”, VIC. If, as for example illustrated in Exhibit 3, model-implied volatility is greater than market volatility, then

- a. if the equity market is correct, model volatility should be lower and therefore the curve should be flatter → put on a flattener.
- b. if the curve is correct, equity volatility should increase → buy equity options/buy volatility.

In the absence of a directional view on either the equity or the credit, the trade would be a combination of both legs – long equity vol and a CDS flattener. The VIC is also useful in indicating where on the curve one should trade. Further examples of curve steepener trades are given on pages 54-56.

Exhibit 3: VIC View



Source: Credit Suisse

IRD

The implied roll-down, IRD, is the expected CDS spread change, annualized. It is derived from the future equity distribution which is calculated from the market ATM option volatility. The roll-down shown by the curve today is what the IRD would be if equity volatility was zero. By using equity market volatility, which is forward-looking, the IRD gives a measure of what the expected roll-down should be – the higher the volatility, the more uncertain the spread outlook, and the greater the potential reduction in roll-down achievable. Positive IRD implies the curve is likely to tighten; negative IRD implies it is likely to widen, and is a negative signal.

SWR

The spread widening risk, SWR, is the amount that spreads widen if the equity price falls by one standard deviation over the next three months. (To calculate the SWR, a one standard deviation decline in equity value, calculated from the current equity price and market ATM option volatility, is input into CUSP to give a forecast CDS spread.) Rising SWR is a negative signal since it means credit is more risky. The measure is a forward looking directional measure only – it is not designed to quantify the probability of large spread movements.

A typical sell signal is SWR rising and a sudden drop in IRD. Further details regarding the drivers of both signals are on pages 29-31.

Z-score

Current values for SWR and IRD are in the CUSP Risk Report (Exhibit 1); history is in the CUSP issuer details (Exhibit 2). Both values should be interpreted in conjunction with their Z-scores,

$$\text{Z-score} = (\text{current value} - 3 \text{ month average}) / (3 \text{ month standard deviation})$$

Since the Z-score is a standardized measure (being divided by the standard deviation), it enables comparisons between issuers; the raw SWR and IRD numbers need to be considered in the context of spread levels.

A negative IRD signal is therefore a negative IRD and a negative IRD Z-score – indicating that the implied roll-down is both negative, and below recent levels. Conversely, for SWR, a positive SWR Z-score is a negative signal indicating that spread widening risk is greater than its recent average. Z-scores of greater than +2.5 and lower than -2.5 are significant.

Delta

The CUSP delta, as given on the CUSP Risk Report (Exhibit 1), is the equity notional needed to delta-hedge 1 million of CDS (same currency). It is useful for calculating hedge ratios in capital-arbitrage trades.

Quantitative Credit Strategy

Bunt Ghosh, Managing Director
Global Head of Fixed Income Research
+44 20 7888 3042

London

Richard Martin, Director

Global Head
+44 20 7888 4736
richard.martin@credit-suisse.com

Hong Xu, CFA, Vice President

+44 20 7883 6551
hong.xu@credit-suisse.com

Christian Schwarz, Associate

+44 20 7888 3161
christian.schwarz.2@credit-suisse.com

Eleanor Li, Associate

+44 20 7883 6509
eleanor.li@credit-suisse.com

Helen Haworth, Associate

+44 20 7888 0757
helen.haworth@credit-suisse.com

North America

Fer J. Koch, Vice President

+1 212 325 2314
fer.koch@credit-suisse.com

Disclosure Appendix

Analyst Certification

Helen Haworth and Richard Martin 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.

CUSP® Certification and Definition

With respect to the analysis in this report based on the CUSP® methodology, Credit Suisse certifies that (1) the views expressed in this report accurately reflect the CUSP® methodology and (2) no part of the firm's compensation was, is, or will be directly related to the specific views disclosed in this report. CUSP® is an analytical model that relates to an issuer's capital structure, stock price, and the option-implied volatility of its shares to credit risk. CUSP® also provides systematic monitoring of credit risk. Details on the CUSP® methodology can be found on <http://www.credit-suisse.com/cusp> or by contacting the Credit Suisse Quantitative Strategy Group.

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?docid=35321113&type=pdf>. 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 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.

Credit Suisse's Distribution of Global Credit Research Recommendations* (and Banking Clients)

	Global Recommendation Distribution**	
Buy	5%	(of which 96% are banking clients)
Outperform	9%	(of which 89% are banking clients)
Market Perform	28%	(of which 90% are banking clients)
Underperform	9%	(of which 92% are banking clients)
Sell	1%	(of which 100% are banking clients)

*Data are as at the end of the previous calendar quarter.

**Percentages do not include securities on the firm's Restricted List.

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

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 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; in Brazil by Banco de Investimentos Credit Suisse (Brasil) S.A.; in Japan by Credit Suisse Securities (Japan) Limited; 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 Singapore Branch, and elsewhere in the world by the relevant authorised affiliate of the above. Research on Taiwanese securities produced by Credit Suisse, 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.

Please note that this research was originally prepared and issued by CS for distribution to their market professional and institutional investor customers. Recipients who are not market professional or institutional investor customers 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.

Copyright © 2007 CREDIT SUISSE GROUP and/or its affiliates. All rights reserved.

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 regional bonds, Japanese government guaranteed bonds, Japanese corporate bonds) from CS as a seller, you will be requested to pay purchase price only.

CREDIT SUISSE SECURITIES (JAPAN) LIMITED

A member of Japan Securities Dealers Association, The Financial Futures Association of Japan