



Credit research

Measuring credit risk with Duration Times Spread

- Accurate risk measurement is essential for credit investors
- Robeco developed its credit risk measurement framework in 2003
- Duration Times Spread is now the industry standard

Accurately measuring credit risk is a significant challenge for credit investors, as credit volatility varies greatly over time and differs considerably between individual corporate bonds. Robeco researchers¹ developed an innovative method in 2003 to predict credit volatility more adaptively and more granularly. Although no model is ever perfect, the new methodology substantially improved the measurement of credit volatility compared to the traditional models at the time.

The methodology, Duration Times Spread (DTS), has become the industry standard for measuring the credit volatility of a corporate bond. It measures the sensitivity of the price of a bond to relative changes in credit spread, and is a single number that can be used to compare credit volatility across a wide range of bonds. In practice, it is applied in the portfolio management process to assess relative value, manage risk exposure in portfolio construction and conduct performance attribution.

Not all spread-durations are equal

Traditional risk models typically rely on the extrapolation of historical trends. An example is the use of volatility in returns over the most recent 36 months. One disadvantage

of such an approach is that it fails to capture true risk when there is a break in the trend.²

For example, at the onset of the financial crisis in 2007, the output of such models would still have been based mainly on data from the quiet periods of 2005 and 2006, when

Article
For professional investors
November 2019

Patrick Houweling, Portfolio Manager
Olaf Penninga, Portfolio Manager
Erik van Leeuwen, Co-Head Fixed Income



credit spreads were relatively stable, and would have vastly underestimated the risk of a credit portfolio.

Similarly, immediately following a volatile period of large changes in credit spread, a traditional model that relies on historical returns would overestimate risk.

A further problem is that traditional risk measurement models tend to use an absolute approach, and do not account for the fact that the magnitude of spread changes are proportional to spread levels: bonds with wider spreads are riskier because they experience greater spread changes. Accurate risk measurement would thus need to factor in the sensitivity of returns to relative changes in spread.

Traditional models, moreover, are unable to weigh up different types of risk. Credit investors know that longer-dated credit is riskier than shorter-dated credit. They also know that bonds issued by lower-rated names are riskier than higher-quality credits. The difficulty is in comparing these two sources of risk: how, for example, does one rate the risk associated with a short-dated B-rated credit against the risk of a long-dated AA-rated credit?

Calculating Duration Times Spread

The empirical observation that credit spreads move in a relative rather than an absolute fashion is at the heart of our DTS methodology. If higher-spread sectors represent greater exposure to sector-specific risks, then not all spread-durations are equal.

‘The empirical observation that spreads move in a relative rather than an absolute fashion is at the heart of our DTS methodology’

Our in-depth research shows that the risk of a bond – its future price volatility – is best measured by the product of its spread-duration and its spread, which is the DTS.

DTS = bond spread x duration spread of the bond

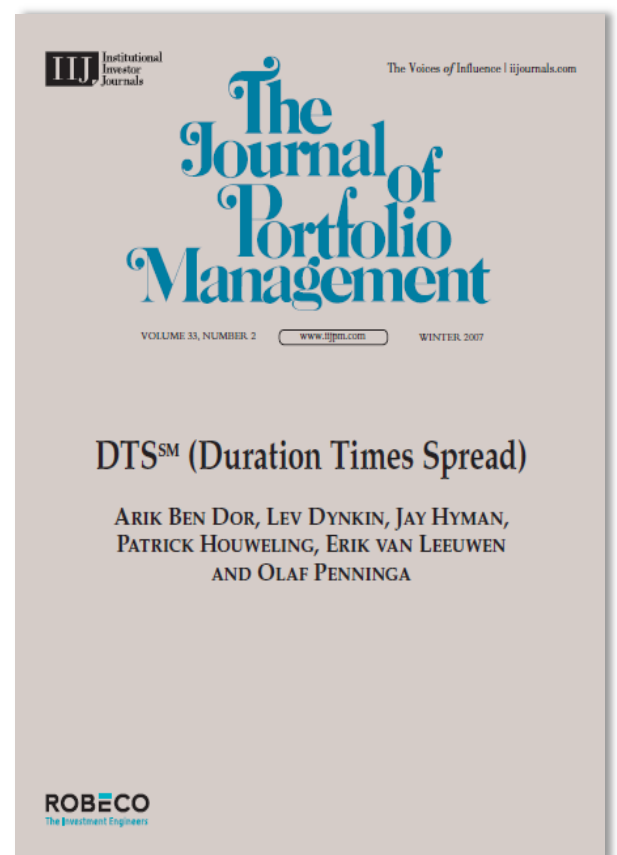
For example, a bond with one-year duration and a spread of 500 basis points has the same expected volatility ($1 \times 500 = 500$) as a bond with five-year duration and spread of 100 basis points ($5 \times 100 = 500$).

As our risk estimates based on this calculation depend directly on the observed spread, they react instantaneously

to market turmoil, and so are more accurate than estimates based on recent history.

The simplicity of the DTS allows for a wide application. As it provides a single measurement, this method can be used to compare the exposure to the credit spreads of different types of credit assets – regardless of rating or maturity, for instance.

It can also be used to compare the risk profile of different credit portfolios. The higher the DTS of a credit asset or a credit portfolio, the more its returns will decline in the event credit spreads widen.



Its versatility of use means that DTS is as important for credit investors as duration is for all fixed income investors.

Industry standard for risk measurement

The DTS concept is used for all of Robeco’s credit-related segments in its fixed income portfolios.³ It is also applied broadly throughout the industry and has been implemented in leading risk management software, including MSCI RiskMetrics and Bloomberg PORT.

Specifically, we apply DTS to the following four key aspects of our portfolio management process.

Risk measurement

Using DTS, we can accurately calculate the contributions to portfolio risk made by individual bonds. Because it is a measure which considers relative changes in spread and not absolute changes, we avoid underestimating the risk of bonds with high spreads and overestimating the risk of bonds with low spreads.

Assessing relative value

We use DTS in assessing the relative value of a bond by looking at its excess return per unit of DTS. In this way, before we invest in high-spread bonds, we ensure the higher risk they involve is properly compensated for through higher return potential.

A powerful tool

We consider DTS to be an accurate methodology for forecasting credit volatility, although on occasion it can be inclined to over- and underestimate risk.

By using it in our credit investment processes, portfolio managers are able to construct well-diversified portfolios in which the risk contributions of their high-conviction positions are measured accurately.

Moreover, risk-adjusted returns can be calculated almost in real time, allowing timely relative value assessment.

Timeline of DTS development and use

- 2003: Robeco research shows that spreads change relatively and not absolutely
- 2004: Robeco implements innovative credit risk modelling for investment grade and high yield
- 2007: Joint publication with Lehman Brothers in Journal of Portfolio Management
- 2008: Barclays implements insight in their POINT risk model
- 2010: Robeco incorporates DTS in Performance Attribution
- 2013: Robeco publishes white paper to commemorate the 10th anniversary of DTS
- 2014: MSCI RiskMetrics incorporates DTS in its risk monitoring system
- 2017: Barclays incorporates DTS in its POINT Performance Attribution module
- 2019: Bloomberg implements DTS in its PORT software
- 2020: Northfield to launch fixed income risk model that incorporates DTS-based process

Portfolio construction

By taking into account the DTS of each position during portfolio construction, our portfolio managers can make sure that, in terms of issuer exposure, the risk contribution of each position is comparable.

Finally, we consider this a tool that allows for portfolio positions to be evaluated periodically in the same framework as they have been implemented, yielding important insights and possibly giving rise to reevaluation of these positions.

Performance attribution

We also conduct our performance attribution based on DTS and relative spread changes. This provides us with an accurate overview of the impact of our decisions on our portfolios performance relative to the benchmark.

¹ A joint project with Lehman Brothers led to the publication of the result; see: Ben Dor, A., Dynkin, L., Hyman, J., Houweling, P., Van Leeuwen, E., and Penninga, O., 'DTS (Duration Times Spread)', *The Journal of Portfolio Management*, 2007, vol. 33. no. 2, pp. 77-100.

² See Beekhuizen, P. and Houweling, P., 'Smart Credit Investing - Risk Points and Their Applications', Robeco White Paper, 2013, December.

³ See 'Guide to credits: The Robeco approach'.

Important Information

Robeco Institutional Asset Management B.V. has a license as manager of Undertakings for Collective Investment in Transferable Securities (UCITS) and Alternative Investment Funds (AIFs) ("Fund(s)") from The Netherlands Authority for the Financial Markets in Amsterdam. This document is solely intended for professional investors, defined as investors qualifying as professional clients, have requested to be treated as professional clients or are authorized to receive such information under any applicable laws. Robeco Institutional Asset Management B.V. and/or its related, affiliated and subsidiary companies, ("Robeco"), will not be liable for any damages arising out of the use of this document. Users of this information who provide investment services in the European Union have their own responsibility to assess whether they are allowed to receive the information in accordance with MiFID II regulations. To the extent this information qualifies as a reasonable and appropriate minor non-monetary benefit under MiFID II, users that provide investment services in the European Union are responsible to comply with applicable recordkeeping and disclosure requirements. The content of this document is based upon sources of information believed to be reliable and comes without warranties of any kind. Without further explanation this document cannot be considered complete. Any opinions, estimates or forecasts may be changed at any time without prior warning. If in doubt, please seek independent advice. It is intended to provide the professional investor with general information on Robeco's specific capabilities, but has not been prepared by Robeco as investment research and does not constitute an investment recommendation or advice to buy or sell certain securities or investment products and/or to adopt any investment strategy and/or legal, accounting or tax advice. All rights relating to the information in this document are and will remain the property of Robeco. This material may not be copied or used with the public. No part of this document may be reproduced, or published in any form or by any means without Robeco's prior written permission. Investment involves risks. Before investing, please note the initial capital is not guaranteed. Investors should ensure that they fully understand the risk associated with any Robeco product or service offered in their country of domicile ("Funds"). Investors should also consider their own investment objective and risk tolerance level. Historical returns are provided for illustrative purposes only. The price of units may go down as well as up and the past performance is not indicative of future performance. If the currency in which the past performance is displayed differs from the currency of the country in which you reside, then you should be aware that due to exchange rate fluctuations the performance shown may increase or decrease if converted into your local currency. The performance data do not take account of the commissions and costs incurred on trading securities in client portfolios or on the issue and redemption of units. Unless otherwise stated, the prices used for the performance figures of the Luxembourg-based Funds are the end-of-month transaction prices net of fees up to 4 August 2010. From 4 August 2010, the transaction prices net of fees will be those of the first business day of the month. Return figures versus the benchmark show the investment management result before management and/or performance fees; the Fund returns are with dividends reinvested and based on net asset values with prices and exchange rates of the valuation moment of the benchmark. Please refer to the prospectus of the Funds for further details. Performance is quoted net of investment management fees. The ongoing charges mentioned in this document are the ones stated in the Fund's latest annual report at closing date of the last calendar year. This document 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, document, availability or use would be contrary to law or regulation or which would subject any Fund or Robeco Institutional Asset Management B.V. to any registration or licensing requirement within such jurisdiction. Any decision to subscribe for interests in a Fund offered in a particular jurisdiction must be made solely on the basis of information contained in the prospectus, which information may be different from the information contained in this document. Prospective applicants for shares should inform themselves as to legal requirements also applying and any applicable exchange control regulations and applicable taxes in the countries of their respective citizenship, residence or domicile. The Fund information, if any, contained in this document is qualified in its entirety by reference to the prospectus, and this document should, at all times, be read in conjunction with the prospectus. Detailed information on the Fund and associated risks is contained in the prospectus. The prospectus and the Key Investor Information Document for the Robeco Funds can all be obtained free of charge at www.robeco.com.

Additional Information for US investors

Robeco is considered "participating affiliated" and some of their employees are "associated persons" of Robeco Institutional Asset Management US Inc. ("RIAM US") as per relevant SEC no-action guidance. Employees identified as associated persons of RIAM US perform activities directly or indirectly related to the investment advisory services provided by RIAM US. In those situations these individuals are deemed to be acting on behalf of RIAM US, a US SEC registered investment adviser. SEC regulations are applicable only to clients, prospects and investors of RIAM US. RIAM US is wholly owned subsidiary of ORIX Corporation Europe N.V. and offers investment advisory services to institutional clients in the US.

Additional Information for investors with residence or seat in Australia and New Zealand

This document is distributed in Australia by Robeco Hong Kong Limited (ARBN 156 512 659) ("Robeco"), which is exempt from the requirement to hold an Australian financial services license under the Corporations Act 2001 (Cth) pursuant to ASIC Class Order 03/1103. Robeco is regulated by the Securities and Futures Commission under the laws of Hong Kong and those laws may differ from Australian laws. This document is distributed only to "wholesale clients" as that term is defined under the Corporations Act 2001 (Cth). This document is not for distribution or dissemination, directly or indirectly, to any other class of persons. In New Zealand, this document is only available to wholesale investors within the meaning of clause 3(2) of Schedule 1 of the Financial Markets Conduct Act 2013 ("FMCA"). This document is not for public distribution in Australia and New Zealand.

Additional Information for investors with residence or seat in Austria

This information is solely intended for professional investors or eligible counterparties in the meaning of the Austrian Securities Oversight Act.

Additional Information for investors with residence or seat in Brazil

The Fund may not be offered or sold to the public in Brazil. Accordingly, the Fund has not been nor will be registered with the Brazilian Securities Commission – CVM, nor has it been submitted to the foregoing agency for approval. Documents relating to the Fund, as well as the information contained therein, may not be supplied to the public in Brazil, as the offering of the Fund is not a public offering of securities in Brazil, nor may they be used in connection with any offer for subscription or sale of securities to the public in Brazil.

Additional Information for investors with residence or seat in Canada

No securities commission or similar authority in Canada has reviewed or in any way passed upon this document or the merits of the securities described herein, and any representation to the contrary is an offence. Robeco Institutional Asset Management B.V. is relying on the international dealer and international adviser exemption in Quebec and has appointed McCarthy Tétrault LLP as its agent for service in Quebec.

Additional information for investors with residence or seat in the Republic of Chile

Neither the issuer nor the Funds have been registered with the Superintendencia de Valores y Seguros pursuant to law no. 18.045, the Ley de Mercado de Valores and regulations thereunder. This document does not constitute an offer of, or an invitation to subscribe for or purchase, shares of the Funds in the Republic of Chile, other than to the specific person who individually requested this information on his own initiative. This may therefore be treated as a "private offering" within the meaning of article 4 of the Ley de Mercado de Valores (an offer that is not addressed to the public at large or to a certain sector or specific group of the public).

Additional Information for investors with residence or seat in Colombia

This document does not constitute a public offer in the Republic of Colombia. The offer of the Fund is addressed to less than one hundred specifically identified investors. The Fund may not be promoted or marketed in Colombia or to Colombian residents, unless such promotion and marketing is made in compliance with Decree 2555 of 2010 and other applicable rules and regulations related to the promotion of foreign Funds in Colombia.

Additional Information for investors with residence or seat in the Dubai International Financial Centre (DIFC), United Arab Emirates

This material is being distributed by Robeco Institutional Asset Management B.V. (DIFC Branch) located at Office 209, Level 2, Gate Village Building 7, Dubai International Financial Centre, Dubai, PO Box 482060, UAE. Robeco Institutional Asset Management B.V. (DIFC Branch) is regulated by the Dubai Financial Services Authority ("DFSA") and only deals with Professional Clients or Market Counterparties and does not deal with Retail Clients as defined by the DFSA.

Additional Information for investors with residence or seat in France

Robeco is at liberty to provide services in France. Robeco France (only authorized to offer investment advice service to professional investors) has been approved under registry number 10683 by the French prudential control and resolution authority (formerly ACP, now the ACPR) as an investment firm since 28 September 2012.

Additional Information for investors with residence or seat in Germany

This information is solely intended for professional investors or eligible counterparties in the meaning of the German Securities Trading Act.

Additional Information for investors with residence or seat in Hong Kong

The contents of this document have not been reviewed by the Securities and Futures Commission ("SFC") in Hong Kong. If you are in any doubt about any of the contents of this document, you should obtain independent professional advice. This document has been distributed by Robeco Hong Kong Limited ("Robeco"). Robeco is regulated by the SFC in Hong Kong.

Additional Information for investors with residence or seat in Italy

This document is considered for use solely by qualified investors and private professional clients (as defined in Article 26 (1) (b) and (d) of Consob Regulation No. 16190 dated 29 October 2007). If made available to Distributors and individuals authorized by Distributors to conduct promotion and marketing activity, it may only be used for the purpose for which it was conceived. The data and information contained in this document may not be used for communications with Supervisory Authorities. This document does not include any information to determine, in concrete terms, the investment inclination and, therefore, this document cannot and should not be the basis for making any investment decisions.

Additional Information for investors with residence or seat in Japan

This document is considered for use solely by qualified investors and is being distributed by Robeco Japan Company Limited, registered in Japan as a Financial Instruments Business Operator, Kanto Local Finance Bureau (FIBO) registration number 2780, Member of Japan Investment Advisors Association.

Additional Information for investors with residence or seat in Peru

The Fund has not been registered with the Superintendencia del Mercado de Valores (SMV) and is being placed by means of a private offer. SMV has not reviewed the information provided to the investor. This document is only for the exclusive use of institutional investors in Peru and is not for public distribution.

Additional Information for investors with residence or seat in Shanghai

This material is prepared by Robeco Overseas Investment Fund Management (Shanghai) Limited Company ("Robeco Shanghai") and is only provided to the specific objects under the premise of confidentiality. Robeco Shanghai has not yet been registered as a private fund manager with the Asset Management Association of China. Robeco Shanghai is a wholly foreign-owned enterprise established in accordance with the PRC laws, which enjoys independent civil rights and civil obligations. The statements of the shareholders or affiliates in the material shall not be deemed to a promise or guarantee of the shareholders or affiliates of Robeco Shanghai, or be deemed to any obligations or liabilities imposed to the shareholders or affiliates of Robeco Shanghai.

Additional Information for investors with residence or seat in Singapore

This document has not been registered with the Monetary Authority of Singapore ("MAS"). Accordingly, this document may not be circulated or distributed directly or indirectly to persons in Singapore other than (i) to an institutional investor under Section 304 of the SFA, (ii) to a relevant person pursuant to Section 305(1), or any person pursuant to Section 305(2), and in accordance with the conditions specified in Section 305, of the SFA, or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA. The contents of this document have not been reviewed by the MAS. Any decision to participate in the Fund should be made only after reviewing the sections regarding investment considerations, conflicts of interest, risk factors and the relevant Singapore selling restrictions (as described in the section entitled "Important Information for Singapore Investors") contained in the prospectus. You should consult your professional adviser if you are in doubt about the stringent restrictions applicable to the use of this document, regulatory status of the Fund, applicable regulatory protection, associated risks and suitability of the Fund to your objectives. Investors should note that only the sub-Funds listed in the appendix to the section entitled "Important Information for Singapore Investors" of the prospectus ("Sub-Funds") are available to Singapore investors. The Sub-Funds are notified as restricted foreign schemes under the Securities and Futures Act, Chapter 289 of Singapore ("SFA") and are invoking the exemptions from compliance with prospectus registration requirements pursuant to the exemptions under Section 304 and Section 305 of the SFA. The Sub-Funds are not authorized or recognized by the MAS and shares in the Sub-Funds are not allowed to be offered to the retail public in Singapore. The prospectus of the Fund is not a prospectus as defined in the SFA. Accordingly, statutory liability under the SFA in relation to the content of prospectuses would not apply. The Sub-Funds may only be promoted exclusively to persons who are sufficiently experienced and sophisticated to understand the risks involved in investing in such schemes, and who satisfy certain other criteria provided under Section 304, Section 305 or any other applicable provision of the SFA and the subsidiary legislation enacted thereunder. You should consider carefully whether the investment is suitable for you. Robeco Singapore Private Limited holds a capital markets services license for fund management issued by the MAS and is subject to certain clientele restrictions under such license.

Additional Information for investors with residence or seat in Spain

Robeco Institutional Asset Management BV, Branch in Spain is registered in Spain in the Commercial Registry of Madrid, in v.19.957, page 190, section 8, page M-351927 and in the Official Register of the National Securities Market Commission of branches of companies of services of investment of the European Economic Space, with the number 24. It has address in Street Serrano 47, Madrid and CIF W0032687F. The investment funds or SICAV mentioned in this document are regulated by the corresponding authorities of their country of origin and are registered in the Special Registry of the CNMV of Foreign Collective Investment Institutions marketed in Spain.

Additional Information for investors with residence or seat in South Africa

Robeco Institutional Asset Management B.V. is registered and regulated by the Financial Sector Conduct Authority in South Africa.

Additional Information for investors with residence or seat in Switzerland

This document is exclusively distributed in Switzerland to qualified investors as defined in the Swiss Collective Investment Schemes Act (CISA). This material is distributed by RobecoSAM AG, postal address: Josefstrasse 218, 8005 Zurich. ACOLIN Fund Services AG, postal address: Affolternstrasse 56, 8050 Zurich, acts as the Swiss representative of the Fund(s). UBS Switzerland AG, Bahnhofstrasse 45, 8001 Zurich, postal address: Europastrasse 2, P.O. Box, CH-8152 Opfikon, acts as the Swiss paying agent. The prospectus, the Key Investor Information Documents (KIIDs), the articles of association, the annual and semi-annual reports of the Fund(s), as well as the list of the purchases and sales which the Fund(s) has undertaken during the financial year, may be obtained, on simple request and free of charge, at the office of the Swiss representative ACOLIN Fund Services AG. The prospectuses are also available via the website www.robeco.ch.

Additional Information for investors with residence or seat in the United Arab Emirates

Some Funds referred to in this marketing material have been registered with the UAE Securities and Commodities Authority (the Authority). Details of all Registered Funds can be found on the Authority's website. The Authority assumes no liability for the accuracy of the information set out in this material/document, nor for the failure of any persons engaged in the investment Fund in performing their duties and responsibilities.

Additional Information for investors with residence or seat in the United Kingdom

Robeco is subject to limited regulation in the UK by the Financial Conduct Authority. Details about the extent of our regulation by the Financial Conduct Authority are available from us on request.

Additional Information for investors with residence or seat in Uruguay

The sale of the Fund qualifies as a private placement pursuant to section 2 of Uruguayan law 18,627. The Fund must not be offered or sold to the public in Uruguay, except in circumstances which do not constitute a public offering or distribution under Uruguayan laws and regulations. The Fund is not and will not be registered with the Financial Services Superintendency of the Central Bank of Uruguay. The Fund corresponds to investment funds that are not investment funds regulated by Uruguayan law 16,774 dated September 27, 1996, as amended.

Additional Information concerning RobecoSAM Collective Investment Schemes

The RobecoSAM collective investment schemes ("RobecoSAM Funds") in scope are sub-Funds under the Undertakings for Collective Investment in Transferable Securities (UCITS) of MULTIPARTNER SICAV, managed by GAM (Luxembourg) S.A., ("Multipartner"). Multipartner SICAV is incorporated as a Société d'investissement à Capital Variable which is governed by Luxembourg law. The custodian is State Street Bank Luxembourg S.C.A., 49, Avenue J. F. Kennedy, L-1855 Luxembourg. The prospectus, the Key Investor Information Documents (KIIDs), the articles of association, the annual and semi-annual reports of the RobecoSAM Funds, as well as the list of the purchases and sales which the RobecoSAM Fund(s) has undertaken during the financial year, may be obtained, on simple request and free of charge, via the website www.robecosam.com.