
Asymptotix
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Structured Product (Impaired Asset) Pricing & Valuation
Theoretical (& applied) Modeling References
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CONTENTS

1. INTRODUCTION

If one is engaged in a process to consider the fair or market or 'economic' value of Structured Products (Collateralized Debt Obligations (CDOs) etc) which is the challenge of the moment, right now; then this set of references could contribute to a lighthouse theory framework for you in beginning to establish an empirical or quantitative environment to meet this requirement. These 'structured assets' are by definition 'Level 3' in IFRS7 terms and thus the valuation philosophy of 'mark to model' must apply since no active reference market for such securities exists in anyway globally. The question is what is the optimum model? This has to be a model defined by practitioners (academic, supervisory or market participants) & in the public domain. Optimally by following one of the theoretical approaches referenced below precisely and by attempting to avoid too much fusion of aspects of preferred approaches since that way leads to "yet another CDO pricing model". We have enough already, from the so elegant they are aesthetic to the simply bonkers (or whacky for our US colleagues). Going the track of 'your special CDO pricing model' takes you further and further and further from transparency and towards a form of solipsism, if Wittgenstein's famous logic is properly understood. Since the current failure of our market-games is a function of a form of solipsism, that is not a route to take. Finally these theoretical approaches to Structured Product valuation are applicable whether the assets are regarded as impaired or not, since in large part the concept of 'impaired-ness' is a function of the lack of existing market pricing reference frameworks and thus a kind of voodoo psychology around these assets right now, driven by apocryphal assumptions of the value of underlying model variables.

2. REFERENCES – Current Research

2.1. Modelling the Evolution of Credit Spreads using the Cox Process within the HUM Framework: A CDS Option Pricing Model

http://www.dsems.unifg.it/q272007.pdf

CARL CHIARELLA (SCHOOL OF FINANCE AND ECONOMICS, UNIVERSITY OF TECHNOLOGY, SYDNEY). VIVIANA FANELLI (DIPARTIMENTO DI SCIENZE ECONOMICHE, MATEMATICHE E STATISTICHE, UNIVERSITÀ DEGLI STUDI DI FOGGIA). SILVANA MUSTI (DIPARTIMENTO DI SCIENZE ECONOMICHE, MATEMATICHE E STATISTICHE, UNIVERSITÀ DEGLI STUDI DI FOGGIA)

In this paper a simulation approach for defaultable yield curves is developed within the Heath et al. (1992) framework. The default event is modelled using the Cox process where the stochastic intensity represents the credit spread. The forward credit spread volatility function is affected by the entire credit spread term structure. The paper provides the defaultable bond and CDS option price in a probability setting equipped with a subfiltration structure. The Euler-Maruyama stochastic integral approximation and the Monte Carlo method are applied to develop a numerical algorithm for pricing. Finally, the Antithetic Variables technique is used to reduce the variance of CDSO estimations.

2.2. The 2007 meltdown in structured securitization: searching for lessons, not scapegoats

http://siteresources.worldbank.org/INTFR/Resources/KaneCaprioDemirgucKunt-The2007Meltdown.pdf

CAPRIO, GERARD, JR. DEMIRGUC-KUNT, ASLI, KANE, EDWARD J.

The intensity of recent turbulence in financial markets has surprised nearly everyone. This paper searches out the root causes of the crisis, distinguishing them from scapegoating explanations that have been used in policy circles to divert attention from the underlying breakdown of incentives. Incentive conflicts explain how securitization went wrong, why credit ratings proved so inaccurate, and why it is superficial to blame the crisis on mark-to-market accounting, an unexpected loss of liquidity, or trends in globalization and deregulation in financial markets. The analysis finds disturbing implications of the crisis for Basel II and its implementation. The paper argues that the principal source of financial instability lies in contradictory political and bureaucratic incentives that undermine the effectiveness of financial regulation and supervision in every country in the world. The paper concludes by identifying reforms that would improve incentives by increasing transparency and accountability in government and industry alike.

2.3. An Empirical Analysis of Asset-Backed Securitization

http://www.fmpm.ch/docs/11th/papers_2008_web/A2c.pdf

BY VINK, DENNIS

In this study we provide empirical evidence demonstrating a relationship between the nature of the assets and the primary market spread. The model also provides predictions on how other pricing characteristics affect spread, since little is known about how and why spreads of asset-backed securities are influenced by loan tranche characteristics. We find that default and recovery risk characteristics represent the most important group in explaining loan spread variability. Within this group, the credit rating dummies are the most important variables to determine loan spread at issue. Nonetheless, credit rating is not a sufficient statistic for the determination of spreads. We find that the nature of the assets has a substantial impact on the spread across all samples, indicating that primary market spread with backing assets that cannot easily be replaced is significantly higher relative to issues with assets that can easily be obtained. Of the remaining characteristics, only marketability explains a significant portion of the spreads' variability. In addition, variations of the specifications were estimated in order to asses the robustness of the conclusions concerning the determinants of loan spreads.

2.4. ABS, MBS and CDO compared: an empirical analysis

http://www.securitization.net/pdf/Publications/Vink_ABSMBSCDO.pdf

VINK, DENNIS

The capital market in which asset-backed securities are issued and traded is composed of three main categories: ABS, MBS and CDOs. We were able to examine a total number of 3,466 loans (worth €548.85 billion) of which 1,102 (worth €163.90 billion) have been classified as ABS. MBS issues represent 1,782 issues (worth €320.83 billion), and 582 are CDO issues (worth €64.12 billion). We have investigated how common pricing factors compare for the main classes of securities. Due to the differences in the assets related to these securities, the relevant pricing factors for these securities should differ, too. Taking these three classes as a whole, we have documented that the assets attached as collateral for the securities differ between security classes, but that there are also important univariate differences to consider. We found that most of the common pricing characteristics between ABS, MBS and CDO differ significantly. Furthermore, applying the same pricing estimation model to each security class revealed that most of the common pricing characteristics associated with these classes have a different impact on the primary market spread exhibited by the value of the coefficients. The regression analyses we performed suggest that ABS, MBS and CDOs are in fact different instruments, as implied by the differences in impact of the pricing factors on the loan spread between these security classes.

2.5. Structured finance and the financial turmoil of 2007-2008: and introductory overview

http://www.bde.es/informes/be/ocasional/do0808e.pdf

SARAI CRIADO (BANCO DE ESPAÑA) & ADRIAN VAN RIXTEL (BANCO DE ESPAÑA)

This paper provides an overview of the most important structured finance instruments in the context of the development of the financial turmoil that started in the third quarter of 2007 and continued into 2008. These financial market tensions were triggered by concerns about exposures of financial institutions to the most risky segment of the US mortgage markets -the so-called subprime mortgage market- and related financial instruments, which predominantly were related to structured finance. As structured finance has developed very fast in recent years and often involves highly complex financial instruments and techniques, which may not be understood completely beyond a small circle of financial market experts, the aim of this paper is to provide an introduction to these instruments that may serve to better understand the specific characteristics of the financial turmoil. In this context, the paper proposes a specific classification of structured finance and discusses both securitizations and credit derivatives with the aim of explaining their specific contributions to the development of the financial turmoil. To this extent, the paper differentiates between two main categories of structured finance instruments. The first one played an important role in the initiation and propagation of the turmoil and includes mortgage-backed securities (MBS), asset backed commercial paper (ABCP) and collateralized debt obligations (CDOs), both cash flow and synthetic. The second category of structured finance instruments involves those that have been more instrumental in monitoring the crisis, both for market participants and policymakers. The main instruments here are credit default swaps (CDS), of which examples are presented for both single name and index contracts. Finally, the paper provides an overview of the specific contagion channels involving various structured finance instruments. This will be conducted on the basis of examples for hypothetical financial institutions that are nevertheless representative for real world developments such as they occurred in the course of 2007 and 2008.

2.6. Innovations in credit risk transfer: implications for financial stability

http://www.bis.org/events/brunnen07/duffiepap.pdf

BY DARRELL DUFFIE (NO LESS!)

Banks and other lenders often transfer credit risk to liberate capital for further loan intermediation. This paper aims to explore the design, prevalence and effectiveness of credit risk transfer (CRT). The focus is on the costs and benefits for the efficiency and stability of the financial system. After an overview of recent credit risk transfer activity, the following points are discussed: motivations for CRT by banks; risk retention; theories of CDO design; specialty finance companies. As an illustration of CLO design, an example is provided showing how the credit quality of the borrowers can deteriorate if efforts to control their default risks are costly for issuers. An appendix is provided on CDS index tranches.

2.7. Market conditions, default risk and credit spreads.

http://www.bundesbank.de/download/bankenaufsicht/dkp/200808dkp_b_.pdf

TANG, DRAGON YONGJUN & YAN, HONG

This study empirically examines the impact of market conditions on credit spreads as motivated by recently developed structural credit risk models. Using credit default swap (CDS) spreads, we find that, in the time series, average credit spreads are decreasing in GDP growth rate, but increasing in GDP growth volatility. We document that credit spreads are lower when investor sentiment is high and when the systematic jump risk is low. In the cross section, we confirm that firm-level cash flow volatility raises credit spreads. More importantly, we demonstrate that the impact of market conditions on credit spreads is substantially affected by firm heterogeneity. During economic expansions, ceteris paribus, firms with high cash flow betas have lower credit spreads than those with low cash flow betas. This relation disappears during economic recessions, consistent with theoretical predictions.

2.8. The pricing of correlated default risk: evidence from the credit derivatives market

http://www.bundesbank.de/download/bankenaufsicht/dkp/200809dkp_b_.pdf

TARASHEV, NIKOLA A. & ZHU, HAIBIN

In order to analyze the pricing of portfolio credit risk – as revealed by tranche spreads of a popular credit default swap (CDS) index – we extract risk-neutral probabilities of default (PDs) and physical asset return correlations from single-name CDS spreads. The time profile and overall level of index spreads validate our PD measures. At the same time, the physical asset return correlations are too low to account for the spreads of index tranches and, thus, point to a large correlation risk premium. This premium, which covaries negatively with current realized correlations and positively with future realized correlations, sheds light on market perceptions of and attitude towards correlation risk.

2.9. Interaction of market and credit risk: an analysis of inter-risk correlation and risk aggregation

http://www.bundesbank.de/download/bankenaufsicht/dkp/200811dkp_b_.pdf

BÖCKER, KLAUS & HILLEBRAND, MARTIN

In this paper we investigate the interaction between a credit portfolio and another risk type, which can be thought of as market risk. Combining Merton-like factor models for credit risk with linear factor models for market risk, we analytically calculate their interrisk correlation and show how inter-risk correlation bounds can be derived. Moreover, we elaborate how our model naturally leads to a Gaussian copula approach for describing dependence between both risk types. In particular, we suggest estimators for the correlation parameter of the Gaussian copula that can be used for general credit portfolios. Finally, we use our findings to calculate aggregated risk capital of a sample portfolio both by numerical and analytical techniques.

2.10. Some Determinants of the Price of Default Risk

http://fmg.lse.ac.uk/upload_file/1075_R_Anderson.pdf

RON ANDERSON

In this paper we study the pricing of credit risk as reflected in the market for credit default swaps (CDS) between 2003 and 2008. This market has newly emerged as the reference for credit risk pricing because of its use of standardized contract specifications and has achieved a higher level of liquidity than typically prevails in the markets for the underlying notes and bonds of the named corporate issuers. We initiate our exploration by studying a particular case which allows us to set out some of the issues of CDS pricing in a simple way. We show that for the purposes of accounting for relatively short-term changes of CDS spreads, an approach based on the structural models of credit risk faces an important obstacle in that reliable information about the liabilities required to calculate the \\distance to default are available only quarterly or in some cases annually. Thus structural models account for short-term movements in credit spreads largely by changes in the issuer's equity price. In the case studied we show the effect of equity returns in explaining weekly changes of spreads is insignificant and of the wrong sign. In examination of particular episodes when the CDS spread was particularly delinked from the equity series, we conclude that a likely explanation is changes in expectations about the planned capital market operations. Since these are hard to capture in an observed proxy variable, we argued that this motivates the use of latent variable models that have recently been employed in the credit risk literature. We further see that movements in the CDS spreads for the particular name chosen are highly correlated with an index of CDS spreads for industrial Blue-chip names.

3. REFERENCES – SAP B2P2 White Paper

http://www.sap.com/uk/images/baselii/whitepaper.pdf

3.1. Model Foundations for the Supervisory Formula Approach,

MICHAEL B.GORDY, BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM, JULY 2004

http://www.moodyskmv.com/conf05/pdf/papers/m_gordy.pdf

3.2. Basel 2 and Securitisation A Paradigm Shift,

J P MORGAN, EUROPEAN SECURITIZED PRODUCTS RESEARCH, 30 JANUARY 2006

No longer available but referred in 'Securitisation and the Bank Lending Channel' ECB Working Paper no. 838; http://www.ecb.int/pub/pdf/scpwps/ecbwp838.pdf

3.3. What central banks can learn about default risk from credit markets?

IAN W MARSH,

Bank of England, BIS Papers No 12,

http://www.bis.org/publ/bppdf/bispap12o.pdf

4. REFERENCES – Asymptotix Economic Capital WP

This approach to a consolidation of theoretical material (the "theory forge" idea) grew from the development of a 'White Paper' (WP) which Asymptotix developed with **Revolution Computing**; http://www.revolution-computing.com/index.php this year (2009); the references to which, reflect the state of the art in terms of Economic Risk Capital estimation and Stress testing; the paper is available here; http://www.asymptotix.eu/ecap.pdf and the references are available separately here; http://www.asymptotix.eu/node/94 A related set of references is available here http://www.asymptotix.eu/node/88 These references can be regarded as asymptotix contribution to 'kick-starting' the consolidated theoretical repository concept.

5. Author

AUTHOR: John A Morrison. John is a Predictive Analytics and large scale data management person, particularly in Financial Service, since he was in Asset Management in Edinburgh, when the Telex machine chuntered the Hong Kong closing prices around coffee time every morning. John lives for Financial Predictive Analytics; it's his hobby and his profession. John A Morrison is a Solution Architect in Risk Management. He is Director, Solution Partnerships of **Asymptotix** SA and an advisor to **REvolution Computing**. John has worked for IBM UK and SAP UK. He has advised, amongst others; HSBC, Lloyds, HBOS, Anglo Irish Bank, Prebon Marshall Yamane, UBS Warburg and Bank Vontobel. He trained at Deloitte and KPMG. His academic background is Monetary Econometrics.

5.1. Related Document

Any analyst or Project Manager or indeed executive tasked with introducing macroprudential stress testing and risk capital estimation today is potentially going to be bewildered by the enormous riches of CRAN-R and R-Forge, a lot of the content being irrelevant to the task at hand. Without an expert eye, it is difficult to identify the subset of R objects which can deliver quickly. Here the selection process is done for you. This list is appropriate for Credit Economic Capital Estimation, Liquidity Risk, general market risk and holistic stress testing to support total economic capital quantification, risk capital estimation and credit economic capital quantification.

http://www.asymptotix.eu/greenpaper.pdf