

The Empirical Analysis of Liquidity

Craig W. Holden

Kelley School of Business
Indiana University, USA
cholden@indiana.edu

Stacey Jacobsen

Cox School of Business
Southern Methodist University, USA
staceyj@cox.smu.edu

Avanidhar Subrahmanyam

Andersen School of Management,
University of California, Los Angeles, USA
subra@anderson.ucla.edu

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Credit Default Swaps: A Survey

Patrick Augustin
McGill University — Desautels Faculty of Management, Canada
Patrick.Augustin@mcgill.ca.

Marti G. Subrahmanyam
New York University — Leonard N. Stern School of Business, USA
msubrahm@stern.nyu.edu.

Dragon Yongjun Tang
University of Hong Kong — Faculty of Business and Economics,
Hong Kong
yjtang@hku.hk.

Sarah Qian Wang
University of Warwick — Warwick Business School, UK
Qian.Wang@wbs.ac.uk.

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Abstract

Credit default swaps (CDS) have been growing in importance in the global financial markets. However, their role has been hotly debated, in industry and academia, particularly since the credit crisis of 2007–2009. We review the extant literature on CDS that has accumulated over the past two decades. We divide our survey into seven topics after providing a broad overview in the introduction. The second section traces the historical development of CDS markets and provides an introduction to CDS contract definitions and conventions. The third section discusses the pricing of CDS, from the perspective of no-arbitrage principles, structural, and reduced-form credit risk models. It also summarizes the literature on the determinants of CDS spreads, with a focus on the role of fundamental credit risk factors, liquidity and counterparty risk. The fourth section discusses how the development of the CDS market has affected the characteristics of the bond and equity markets, with an emphasis on market efficiency, price discovery, information flow, and liquidity. Attention is also paid to the CDS-bond basis, the wedge between the pricing of the CDS and its reference bond, and the mispricing between the CDS and the equity market. The fifth section examines the effect of CDS trading on firms' credit and bankruptcy risk, and how it affects corporate financial policy, including bond issuance, capital structure, liquidity management, and corporate governance. The sixth section analyzes how CDS impact the economic incentives of financial intermediaries. The seventh section reviews the growing literature on sovereign CDS and highlights the major differences between the sovereign and corporate CDS markets. In the eight section, we discuss CDS indices, especially the role of synthetic CDS index products backed by residential mortgage-backed securities during the financial crisis. We close with our suggestions for promising future research directions on CDS contracts and markets.

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Introduction

Two decades have passed since the first *credit default swap* (CDS) contract was traded in 1994 [Tett, 2009]. The market has grown spectacularly, especially since 2000. It went through a boom in 2001–2007, followed by a bust after the 2008 Lehman bankruptcy. Most importantly though, the market has proved resilient in the face of several major shocks and corrections. The Russian default in 1998, the Con-seco Finance restructuring in 2000, the 2008 AIG bailout, and the 2012 Greek default all contributed to shaping the formalization of CDS contracts and their trading procedures as we know them today. The seminal study by Longstaff et al. [2005], which used CDS as a tool to disentangle credit from liquidity risk in corporate yield spreads, is by far the most cited paper on CDS, and it provides an excellent introduction to the CDS contract and its market. Since the publication of their paper, the CDS literature has blossomed. Accordingly, our survey mostly covers studies in the last decade.

Our attention is first dedicated to the structure of the CDS market. In particular, we explain the many colorful subtleties of CDS contracts and we document the development of the contract templates. We also describe the *over-the-counter* (OTC) nature of the CDS market, and

the controversies surrounding contract settlements via CDS auctions, which is one of the many emerging research debates that the CDS literature has stimulated. The CDS market has likely faced its toughest test with the 2007–2009 credit crisis, as it was heavily criticized for facilitating the creation of synthetic mortgage-backed securities (MBS). However, the role of CDS was also controversial during the sovereign default episodes of Greece and Argentina, as “naked” CDS buyers in particular were blamed for speculating on government defaults and artificially driving up their borrowing costs. Another scandalous landmark in the CDS history is the 2012 J.P. Morgan “London Whale” CDS trading loss. In the post-crisis period, a regulatory overhaul has been implemented both in the United States (U.S.) and in the European Union (E.U.). First came the CDS “Big Bang” and “Small Bang” in 2009, which pushed for further standardization of the CDS contract; then came the temporary ban on naked CDS in Germany, made permanent by the E.U. in 2011. CDS have become the subject of many financial regulations, including the Basel III bank regulations and the Dodd-Frank Act.

Participants in the U.S. CDS market have arguably seen the biggest structural change in CDS history in 2013, with new rules forcing the use of central counterparties (CCPs) and new trading platforms. Central clearing for index CDS was introduced in 2013 with the mandatory use of a swap execution facility (SEF) for some contracts. Also, 2014 marks a new era for CDS trading, as contracts designated as “made available to trade” (MAT) have had to be traded on SEFs or Designated Contract Markets (DCMs) since February 26, 2014. The new ISDA 2014 Credit Derivatives Definitions were announced to go live in September 2014. However, the default of Argentina in July 2014 complicated the matter and forced existing sovereign contracts to comply with the older 2003 Definitions.

The pricing of CDS is by far the most understood issue in the literature, which is partly due to the tight relationship between CDS and corporate bonds and a vast literature on the determinants of bond spreads. Early works used to view the CDS spread as a pure measure of credit risk, although it is today understood that many other factors are important in capturing both time-series and cross-sectional variation in

CDS spreads and their changes. A separate literature has emerged on the role of liquidity in CDS spreads, and how liquidity can affect price discovery. We discuss both the structural and reduced-form credit risk models that are used for CDS pricing and we discuss their predictions for the determinants of spreads that have been tested in the empirical literature. Other frictions such as counterparty risk are also discussed.

The relationship between the CDS and related markets, in particular the bond and equity markets, is intriguing and important. Even though theory predicts an accounting identity between CDS and bond spreads and a relationship between CDS and equity markets, investors saw significant price discrepancies during the financial crisis that appeared as great arbitrage opportunities. Price discrepancies were particularly strong between the CDS and bond markets, giving rise to the so-called negative CDS-bond basis. Understanding the basis requires a thorough analysis of the market differences. While the literature has made progress in understanding why the basis became negative, we are still far from understanding why it remained persistently negative for an extended period of time. In addition to pricing discrepancies, we also discuss the literature on information flow between CDS and related markets, and the related concept of price discovery. Finally, we examine how the inception of CDS has affected the pricing, efficiency and liquidity of closely related markets.

With the inception of CDS trading, market participants, both creditors and the firms themselves, have received access to credit risk transfer mechanisms. The ability to purchase CDS protection can change creditors' incentives and permits the creation of tough "empty creditors," enabled through the separation of cash flow from voting rights. The "empty creditor" debate is yet another important research issue that has gathered a lot of steam over the last years. We discuss it in detail, along with other implications of CDS trading for corporate finance and corporate governance. The CDS-induced changes in the debtor-creditor landscape affect credit supply, credit risk, and corporate policy.

We further focus our attention on the role of CDS for financial intermediaries, both banks and other financial institutions. In particular, we look at how the existence of CDS may change the risk-taking behavior

of lenders or their credit supply. Alternatively, we show how banks may potentially exploit their informational advantage from customer relationships and how this can be reflected in CDS spreads. In general, it is interesting to observe that, although CDS were originally used by banks to hedge their loan risk, the use by banks nowadays is still rather limited, with CDS primarily used for trading purposes, and concentrated among a few dominant dealers.

We also dedicate an entire section to sovereign CDS. The interest in sovereign credit risk has been revived with the series of sovereign defaults in both emerging and developed countries during the last two decades. In particular, the European sovereign debt crisis was a major catalyst in generating many contributions to the literature. Sovereign CDS were no less controversial than corporate CDS during the 2008 meltdown. The fact that they technically allow speculation on a government default has led to important political debates with an effective ban on “naked” CDS in the E.U. Various dimensions of this default episode have opened up research questions that are starting to be addressed in the finance, economics, and legal literature. We attempt to patch the various angles of analysis together with the goal of providing a coherent and comprehensive picture of the existing results.

Many of the existing studies are on single-name CDS; we also review the literature on CDS index products. It is probably not surprising that the bulk of this literature has focused on the role of index products or collateralized debt obligations tied to the performance of mortgage-backed securities. CDS were particularly controversial during the financial crisis as they facilitated the creation of synthetic mortgage-backed securities. On the other hand, we will also discuss how CDS index products allowed the aggregation of information about toxic assets in the system and how this may have created a panic in the financial markets. The number of different products tied to CDS is growing and it is an exciting market to follow. J.P. Morgan even designed an exchange-traded fund (ETF) based on CDS contracts in August 2014.

There are several prior articles providing survey discussions about CDS. Das and Hanouna [2006] provide the first synthesis of the CDS literature with a focus on pricing. Stulz [2010] gives a great account

of the role of CDS during the financial crisis. The focus of Bolton and Oehmke [2013] is on how CDS may affect the incentives of individual market participants, including end-users, debtors and creditors. Jarrow [2011] draws parallels between the CDS and actuarial insurance markets, and Augustin [2014] concentrates on the sovereign CDS literature. Griffin [2014] discusses research in accounting. However, previous reviews typically focus on only one specific aspect of the CDS market. This manuscript is more comprehensive in scope and covers all major research domains involving CDS.

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