Essays on Credit Default Swaps

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Another turning point, a fork stuck in the road
Time grabs you by the wrist, directs you where to go
So make the best of this test and don't ask why
It's not a question, but a lesson learned in time
It's something unpredictable, but in the end it's right
I hope you had the time of your life

Good Riddance (Time of your Life) by Green Day

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Contents

Submitted research papers in chronological order

1. Hippert, B., Uhde, A. and Wengerek, S. T. (2019a). Portfolio benefits of adding corporate credit default swap indices: Evidence from North America and Europe. *Review of Derivatives Research*, 22(2):203-259.

2. Hippert, B., Uhde, A. and Wengerek, S. T. (2019b). Determinants of CDS trading on major banks. *Working Paper*, Paderborn University.

3. Hippert, B. (2019). The relationship between announcements of complete mergers and acquisitions and acquirers' abnormal CDS spread changes. *Working Paper*, Paderborn University.

Part I Synopsis

1 Motivation

Despite the comparatively short history of credit default swaps (CDSs), they are one of the fastest growing and most controversially discussed financial innovations from the last decades. Actually, a CDS can simply be seen as insurance that offers protection against the default of a company, government or credit (portfolio) (Hull, 2012). The eventful history of CDSs started in 1994 when J.P. Morgan sold their credit risk exposure to Exxon (Tett, 2009). Following a boom phase from 2001 to 2007, the CDS market declined sharply after the Lehman bankruptcy, since CDSs were heavily criticized for facilitating the creation of synthetic securitizations. Additionally, CDSs played an important role during the sovereign defaults of Argentina and Greece as 'naked' CDS buyers speculated on government defaults which resulted in higher borrowing costs (Augustin et al., 2014). These events have led to a strong regulation of CDSs in the U.S. and Europe starting with the 'Big Bang' and 'Small Bang' protocols in 2009, which were the first attempts to standardize CDS contracts. Subsequently, at first Germany, and later the EU, banned naked CDSs and financial regulators included CDS trading in the Basel III framework and the Dodd-Frank Act. However, the strongest regulatory change for CDSs has been made by the introduction of central counterpartys (CCPs) and new trading platforms in 2013. Furthermore, the implementation of the ISDA (International Swaps and Derivatives Association) 2014 Credit Derivatives Definitions facilitated the trading with CDS remarkably due to higher standardization (Augustin et al., 2014). Nowadays, the market for credit derivatives is still the third largest over-the-counter (OTC) derivatives market worldwide with an outstanding notional amount of about 8.37 trillions of USD in the second half of 2018 (BIS, 2019).[1]

Among all credit derivatives, CDSs are the simplest as well as the most discussed and analyzed financial instrument. Hence, the scientific literature on CDSs is vast, while the biggest part deals with the pricing of CDS which is based on the seminal works of Merton (1974), who introduced a structural approach, as well as a reduced-form model approach introduced by Jarrow and Turnbull (1995).

The cumulative dissertation at hand contributes to other well-established strands of the CDS literature, i.e. the relationship between the CDS market and the related corporate bond and equity markets, the risk perception of CDS investors in corporate firms and

[1] The largest market for OTC derivatives is the market for interest rate derivatives (436.84 trillions of USD) followed by foreign exchange derivatives (90.66 trillions of USD).

financial intermediaries during M&A transactions as well as literature focusing on CDS indices. Furthermore, this dissertation provides deeper insights into the question of how CDSs are used as an investment vehicle and why CDSs are traded on banks.

Initially, Hippert et al. (2019a) is, to the best of my knowledge, the first paper that analyzes CDS indices as an alternative asset class for trading credit risk exposure in a portfolio context. In this context, the authors explain the diversification potentials of CDS indices for a traditional financial portfolio consisting of sovereign bonds and stocks. In a next step, Hippert et al. (2019b) elaborate why investors buy default insurance on banks by using a new measure, i.e. the stock amount of CDS trading on a specific bank. Finally, Hippert (2019) analyzes the impact of announcements of mergers and acquisitions on the risk perception of CDS investors of acquiring corporate firms as measured by the abnormal increase in CDS spread changes.

The remainder of this dissertation is organized as follows. Section 2 of Part I summarizes the submitted papers and discusses the research gaps. Furthermore, Section 2 shows the scientific dissemination as well as detailed information of the contributions regarding the co-authors of the three submitted research papers which are presented in Parts II to IV in chronological order.

2 Summary of the submitted research papers

This section introduces the research papers which are included in this cumulative dissertation. Table 1 provides a short overview of the submitted papers. Each subsection summarizes the respective research paper, carves out the research gaps, points out the contribution to the different strands of literature and indicates possible future research. Additionally, the workflow, information on the joint work process and the scientific dissemination are reported in Tables 2 to 4.

2.1 Hippert et al. (2019a)

In Part II of this dissertation Hippert et al. (2019a) investigate portfolio gains of corporate CDS indices when adding corporate CDS indices to a traditional portfolio of stock and sovereign bond indices. Typically, asset managers strive to contemporaneously build portfolios with sufficient return over the risk free rate and reasonable risk exposure. However, the portfolio construction has become increasingly difficult during the last decades as correlations of different

Table 1: Overview of submitted research papers

Source	Methodology	Data sources	Research question
Hippert et al. (2019a)	Out-of-sample portfolio optimization	Markit, Thomson Reuters Datastream and EIKON	Are there portfolio benefits from adding corporate CDS indices to a traditional portfolio consisiting of stock and bond indices?
Hippert et al. (2019b)	Linear panel model with fixed effects	DTCC, Markit, Thomson Reuters Datastream and EIKON, Orbis Bank Focus, Bankscope, World Bank's WDI, Financial Stability Board, International Monetary Funds's IFS	Why do investors buy default insurance on banks?
Hippert (2019)	Event study	Markit, Thomson Reuters SDC, Datastream and EIKON	How do announcements of M&As affect the abnormal CDS spread of an acquirer?

asset classes are rising and a high degree of volatility is transmitted during times of financial turmoil (see e.g. Solnik et al., 1996; Hunter and Simon, 2005; Wu et al., 2005; Cappiello et al., 2006; Mensi et al., 2013; Silvennoinen and Thorp, 2013). Under such a framework investors usually seek protection in 'safe-haven' assets like sovereign bonds and commodities (e.g. gold). However, it has become apparent that even the risk-diversification potential of sovereign bonds has declined during the global financial crisis and the European sovereign debt crisis (Dufour et al., 2017). Therefore, Hippert et al. (2019a) introduce CDS indices as an alternative asset class for trading credit risk exposure in a portfolio context. Their main finding is that, albeit sharing similar fundamentals with traditional assets, corporate CDS indices provoke a significant (tail) risk diversification effect, which may be useful for institutional investors such as mutual funds, hedge funds and insurance companies.

The study contributes to the existing literature in several ways. Hippert et al. (2019a) tie in with related studies analyzing portfolio effects of different asset classes added to a traditional portfolio (Black and Litterman, 1992; Abanomey and Mathur, 1999; Anson, 1999; Cheung and Miu, 2010; Füss et al., 2016; Consiglio et al., 2017; Liu et al., 2017). The authors extend the literature focusing on CDS indices as an investment vehicle for trading credit risk. In addition, the economic gains for potential CDS index buyers who seek to diversify their traditional portfolios consisting of stocks and bonds are discussed. In this context, the study also investigates the different statistical properties of CDS, stock and bond index returns and thus, elaborates conclusions concerning the relationship between these markets. Moreover, the study contributes to the broad literature that analyzes the information processing of stock, bond and CDS markets.

The analysis uses an out-of-sample mean-variance approach for evaluating the diversification potential of corporate CDS indices. The authors implement several realistic investment constraints, i.e. setting budget and short-sale restrictions. Furthermore, an upper volatility bound is employed to distinguish between aggressive and conservative investors. The performance of the calculated portfolios is analyzed by five measures: value-at-risk, Sharpe Ratio, Sortino Ratio, Omega Ratio and portfolio turnover. In further robustness checks the analysis is extended by transaction costs, short sales, the variation of the risk aversion coefficient as well as the volatility bound and two different asset allocation models, i.e., the utility function is altered to minimize the portfolio's tail risk and the well-established Black-Litterman model is used to verify the baseline results.

Hippert et al. (2019a) find that CDS indices are a suitable instrument for portfolio (tail) risk diversification during the time period from 2006 to 2014. This is true for all analyzed types of investors (aggressive and conservative) and markets (North America and Europe). It is additionally found that the risk diversification effect of corporate CDS indices is persistent during the global financial crisis and the European sovereign debt crisis, even though it is less strong during these crisis periods. Moreover, the analysis reveals that the diversification effect can be traced back to the fact, that sovereign bond indices are substituted by CDS indices due to a better risk-return property of the CDS indices. These findings suggest that CDS indices are adequate for institutional investors with a focus on a long-term and conservative portfolio management. The results remain robust under various robustness checks while several sensitivity analyses provide further important insights into the portfolio effect from adding CDS indices.

Since Hippert et al. (2019a) exclusively focus on corporate CDS indices, future research may conduct a similar portfolio analysis by employing sovereign CDS (indices). As the underlying risk factors correspond to sovereigns instead of corporate firms the interdependences between equity and sovereign CDS may be less pronounced. Instead, the risk factors should rather correspond to sovereign bonds and it would be interesting, if and to what extent sovereign CDS may affect a traditional portfolio's risk exposure.

Table 2: Hippert et al. (2019a): Workflow, joint work and scientific dissemination

Panel A: Workflow and joint work
• Co-authorship with A. Uhde and S. T. Wengerek (B. Hippert (45%), S. T. Wengerek (45%), A. Uhde (10%))
• Idea and first concretization by B. Hippert and S. T. Wengerek
• Elaboration of the theoretical framework and literature review by B. Hippert and S. T. Wengerek
• Compiling of data by B. Hippert and S. T. Wengerek
• Contact with data providers and practitioners by S. T. Wengerek
• Conceptual development and implementation of the empirical methodology by B. Hippert and S. T. Wengerek
• Evaluation of results by B. Hippert and S. T. Wengerek
• First draft by B. Hippert and S. T. Wengerek
• Feedback, comments and corrections by A. Uhde and conference participants
• Revision due to comments by B. Hippert and S. T. Wengerek

Table 2: Hippert et al. (2019a): Workflow, joint work and scientific dissemination (continued)

Panel A: Workflow and joint work (continued)

- Additional statistical implementation for the referee reports by B. Hippert and S. T. Wengerek
- Responses to the reviewer by B. Hippert, A. Uhde and S. T. Wengerek
- Research assistance by H. Becker, F. Beckmann, S. Herwald, M. Kerkemeier, M. Lengacher and C. Uhde

Panel B: Scientific dissemination

- The work on this paper started in October 2014
- Presentation of first ideas in the TAF Brown Bag Seminar in Paderborn (November 2014)
- Presentation at the Hypovereinsbank Ph.D. Workshop in Kiel (July 2015; co-author)
- Presentation at the Fakultätsforschungsworkshop of Paderborn University in Bad Arolsen (September 2015)
- First draft in July 2016
- Presentation at the International Rome Conference of Money, Banking and Finance (December 2016; co-author)
- Presentation at the 2016 Paris Financial Management Conference (December 2016)
- Presentation at the Annual Meeting of the Midwest Finance Association in Chicago (March 2017; co-author)
- Revision after comments from A. Uhde and conference participants (September 2016 - July 2017)
- Submission to the Journal of Banking and Finance (VHB Jourqual: A) in June 2017
- Rejection from the Journal of Banking and Finance in July 2017
- Submission to the Review of Derivatives Research (VHB Jourqual: A) in July 2017
- Receipt of the first referee report (major revisions) in October 2017
- Resubmission in December 2017
- Receipt of the second referee report (minor revisions) in April 2018
- Resubmission in May 2018
- Accepted for publication in the Review of Derivatives Research in September 2018
- Print version available since July 2019

2.2 Hippert et al. (2019b)

In Part III of this dissertation Hippert et al. (2019b) analyze the incentives of investors in the bank CDS market to buy default insurance against banks by means of CDSs using a worldwide sample of 52 banks spanning over a period from 2008 to 2016. The focus on banks is important, since banks play an essential role for the stability of financial markets and economies as it was revealed during the global financial crisis in 2007 and 2008. Although bank defaults were rare in the last decades, the case of Lehman Brothers during the global financial crisis has shown that an unexpected default can have severe consequences. Banks face many types of different risks (credit risk, liquidity risk, exchange rate risk, interest rate risk) and additionally exhibit a large counterparty risk since they are the top liquidity providers in over-the-counter markets (da Silva et al., 2015a). Hence, it might be reasonable for investors to buy CDSs, which are written on banks, due to hedging or speculation motives. In this context, Hippert et al. (2019b) compile in total 30 explanatory variables to gain further insights into the determinants of bank CDS investors. The authors suggest that investors in the bank CDS market mainly follow the hedging motive due to increasing bank risk exposures and buy default insurance on banks in economic downturns. In this context, it is proposed that CDS investors base their decisions on a detailed fundamental analysis.

As pointed out by Augustin et al. (2014), the pricing, the flow of information to and from the CDS market as well as the consequences of the introduction of the CDS market are well explained. However, although studies from other markets (e.g. stocks or options) analyzing trading data show that non-price data contain information which cannot be obtained from price data (Blume et al., 1994; de Launois and Van Oppens, 2005; Lo and Wang, 2009; Fodor et al., 2011), research focusing on the incentives of investors to trade in the (bank) CDS market is scarce. The lack of research is mainly due to limited data availability. Hippert et al. (2019b) employ data on the stock amount of CDS written on a specific bank (outstanding CDS net notional), which is provided by the Depository Trust and Clearing Corporation (DTCC). There are only a few other studies that deal with CDS trading data. For instance, Berg and Streitz (2015) as well as Augustin et al. (2016) focus on sovereign default insurance. On the other hand, and more related to the analysis of Hippert et al. (2019b), Oehmke and Zawadowski (2016) and

da Silva et al. (2015a) analyze the determinants of trading CDSs which are written on corporate firms.

In order to empirically investigate the determinants of trading bank CDSs, Hippert et al. (2019b) apply a time- and bank-fixed panel model with clustered robust standard errors at the bank level.

Hippert et al. (2019b) find that investors in the bank CDS market buy default insurance mainly with the purpose of hedging outstanding bonds. In addition, rising (tail) risks also induce investors to engage in the CDS market. Moreover, it is shown that bank CDS investors react to economic business cycles as they buy countercyclically. Furthermore, the too-big-to-fail doctrine incentivizes investors to hold less CDSs when the bank is classified as a global systemically important bank. Finally, next to the hedging motive, it is additionally found that investors buy CDS to speculate against the default of smaller, not too-big-to-fail banks.

Since the data provided by the DTCC has only recently become available, the universe for future research is broadly diversified. In particular, research may analyze the change in the outstanding CDS net notional of banks. Furthermore, research may also focus on country-specific differences of CDS trading determinants.

Table 3: Hippert et al. (2019b): Workflow, joint work and scientific dissemination

Panel A: Workflow and joint work
• Co-authorship with A. Uhde and S. T. Wengerek (B. Hippert (90%), S. T. Wengerek (5%), A. Uhde (5%))
• Idea and first concretization by B. Hippert
• Elaboration of the theoretical framework and literature review by B. Hippert
• Compiling of data by B. Hippert and S. T. Wengerek
• Conceptual development and implementation of the empirical methodology by B. Hippert
• Evaluation of results by B. Hippert
• First draft by B. Hippert
• Feedback, comments and corrections by A. Uhde, S. T. Wengerek and conference participants
• Revision due to comments by B. Hippert
• Research assistance by S. Herwald, M. Kerkemeier and M. Lengacher

Table 3: Hippert et al. (2019b): Workflow, joint work and scientific dissemination (continued)

Panel B: Scientific dissemination
• The work on this paper started in March 2017
• First draft in April 2018
• Presentation at the Barcelona Graduate School of Economics Summer School (June 2018)
• Presentation at the Hypovereinsbank Ph.D. Workshop in Siegen (July 2018)
• Submission to the Review of Derivatives Research (VHB Jourqual: A) in August 2018
• Receipt of the referee report (reject) from the Review of Derivatives Research in August 2018
• Revision of the paper in August and September 2018
• Submission to the Journal of Banking and Finance (VHB Jourqual: A) in September 2018
• Receipt of the referee report (reject) from the Journal of Banking and Finance in December 2018
• Presentation at the 31st Australasian Finance and Banking Conference in Sydney (December 2018)
• Accepted for presentation at the Annual Meeting of the Midwest Finance Association in Chicago (March 2019; canceled due to funding restrictions)
• Presentation at the Annual Meeting of the Southwestern Finance Association in Houston (March 2019)
• Presentation at the Annual Meeting of the Eastern Finance Association in Miami (April 2019)
• Revision of the paper between April and August 2019

2.3 Hippert (2019)

In Part IV of this dissertation Hippert (2019) employs 492 merger and acquisition (M&A) transactions of 284 acquiring firms from North America and Europe in order to analyze the relationship between announcements of mergers and acquisitions and abnormal CDS spread changes. Even though M&As are a very popular instrument for firms to diversify their businesses and gain corporate growth, empirical studies reveal that most transactions do not create a value-added for the acquiring firm (Bruner, 2002; Christensen et al., 2011). Taking this into account,

Hippert (2019) analyzes the abnormal changes in CDS spreads during M&A announcements and finds that investors in CDSs, that are written on acquiring firms, perceive an increase in the acquirer's credit risk due to the M&A announcement.

The reasons for firms to engage in M&As are manifold. They may have efficiency gains from increased enonomies of scale and scope, strategic gains from an improved competitive position or realize a diversification of cash flows (Ismailescu and Col, 2016). Furthermore, theoretical papers suggest that acquiring firms may have a significantly positive risk effect due to coinsurance (Levy and Sarnat, 1970; Lewellen, 1971; Higgins and Schall, 1975) and when the assets of the merging firms are not perfectly correlated (Amihud and Lev, 1981). However, Shastri (1990) and da Silva et al. (2015b) argue that, despite the coinsurance effect, acquiring firms may lose from expropriation effects depending on the firm characteristics of the target and the acquirer. In this context, Furfine and Rosen (2011) suggest that the default risk of the acquiring firm may increase due to lower credit ratings of the target. Hence, the effects of M&A announcements on an acquiring firm's credit risk are not clear.

There are only few empircal studies analyzing the relationship between M&A announcements and abnormal CDS spread changes. Hraschek et al. (2016) and da Silva et al. (2015b) detect an anticipation effect by investors in the CDS market due to insider trading before M&A announcements. Ismailescu and Col (2016) analyze the impact of U.S. cross-border M&As on the abnormal CDS spread changes and find increasing CDS spread changes for targets in emerging markets and declining CDS spreads for targets in developed countries. The most related study is Hüttermann and Lleshaj (2018) who analyze debtholder wealth effects by means of abnormal CDS spread changes from acquiring and target firms and find a generally decreasing wealth effect due to M&A announcements.

In order to empirically investigate abnormal CDS spread changes with respect to M&A announcements, Hippert (2019) employs the event study methodology following Brown and Warner (1985). The abnormal CDS spread changes are calculated by using a four-factor model proposed by Andres et al. (2016), which controls for the rating category of an acquiring firm (Ismailescu and Col, 2016). In addition, Hippert (2019) utilizes two non-parametric test statistics (the Wilcoxon signed rank test (Wilcoxon, 1945) and the generalized rank test (Kolari and Pynnonen, 2011)) to evaluate the (cumulative) abnormal CDS spread changes. Hippert

(2019) employs non-parametric tests as they tend to dominate parametric tests when analyzing abnormal price changes (Kolari and Pynnonen, 2011).

The study reveals a significant increase in abnormal CDS spread changes at the M&A announcement day (about 165 bps) until two days after the announcement (about 95 bps and 29 bps, respectively). In contrast to da Silva et al. (2015b) as well as Hraschek et al. (2016), the empirical results do not indicate that investors in the CDS market may anticipate M&A announcements. Results from further sensitivity analyses show that the magnitude of the increase in the change of abnormal CDS spreads is due to different deal (deal type, deal size), acquirer (size, buying higher levered firms, leverage change, pre-announcement risk) and target characteristics (valuation, whether the target is rated or not).

Future research may analyze to what extent a country-specific risk factor may have an impact on the acquirers' risks, when they only partly acquire the target. Another promising research question may be whether the credit risk perception of investors in CDSs, which are written on target firms, may also increase during complete M&A transactions.

Table 4: Hippert (2019): Workflow, joint work and scientific dissemination

Panel A: Workflow and joint work
• Single authored paper
• Research assistance by M. Daniel, S. Herwald and M. Lengacher
Panel B: Scientific dissemination
• The work on this paper started in October 2018
• First draft in June 2019
• Revision due to comments from A. Uhde and S. T. Wengerek in July and August 2019
• The paper has not yet been presented or submitted

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