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Abhandlungen

Loss Potential from Credit Derivative Use by Corporate Bond Funds under U.S. and German Regulation – A Cross Country Comparison

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Abstract

This study analyzes the loss potential arising from investments into CDS and CDS use-induced risk and performance implications for a sample of large U.S. and German mutual funds. For several funds in the U.S., the regulatory potential losses arising from selling CDS protection are almost as high as net assets, while in Germany, this potential can be even higher. As opposed to the U.S. funds, German funds face a higher risk exposure, i.e. standard deviation and idiosyncratic risk, and suffer from worse performance due to the enormous selling of credit protection during the crisis. Furthermore, additional analysis of the CDS trading activity of German funds between two consecutive reporting dates suggests that period-end data overlooks many round-trip CDS trades (purchases followed by sales or the other way around) undertaken by management. Thus, funds are able to circumvent the direct leverage restrictions, which limit bank borrowing to 10 % and 33.3 % of net assets in Germany/the EU and the U.S., respectively, by using derivatives, such as CDS, and inflate overall leverage to levels that lie above the value of net assets. Based on the results, it seems advisable that regulators in both countries monitor rules restricting the speculative use of derivatives.

Keywords: Mutual funds, leverage, derivative, credit default swaps, regulation

JEL-Classification: G11, G15, G23, G28

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Das Verlustpotential von Rentenfonds aufgrund ihrer Kreditderivatenutzung unter Berücksichtigung der amerikanischen und deutschen Regulierung – Eine Ländervergleichsstudie

Zusammenfassung

Die Studie analysiert das aus gehaltenen CDS-Positionen resultierende Verlustpotential sowie die Auswirkungen der CDS-Nutzung auf das Risiko-Rendite-Profil der größten amerikanischen und deutschen Fonds. Das regulatorische Verlustpotential aus CDS-Nutzung von U.S Fonds erreicht vereinzelt die Höhe ihres eigenen Nettofondsvermögens, während in Deutschland dieses Potential sogar höher werden kann. Im Gegensatz zu U.S. Fonds, weisen deutsche Fonds in der Finanzkrise ein höheres Risiko auf und generieren Verluste aufgrund des erhöhten Verkaufs von CDS-Absicherungen. Weitere Untersuchungen weisen zudem darauf hin, dass die zum Berichterstattungszeitpunkt ausgewiesene CDS-Nutzung deutscher Fonds einen kleineren Teil der vom Management vorgenommenen CDS-Transaktionen ausmacht (insbesondere bleiben im selben Halbjahreszeitraum zwischen zwei Berichterstattungszeitpunkten Käufe von CDS-Absicherungen, die von Verkäufen dieser gefolgt werden und umgekehrt unbemerkt). Folglich können Fonds die Leverage-Regeln, die es vorsehen, dass Kreditaufnahmen in Deutschland/der EU höchsten 10 % und in den U.S.A. 33,3 % des Nettofondsvermögens betragen, umgehen, indem sie Derivate wie beispielsweise CDS nutzen. Auf diese Weise können sie ihr Gesamt-Leverage auf ein Niveau über den eigenen Nettofondswert hieven. Basierend auf den Ergebnissen dieser Studie wäre es aus Investorensicht empfehlenswert, dass die Regulierungsbehörden in beiden Ländern die Regeln betreffend die spekulative Nutzung von Derivaten verstärkt überwachen.

I. Introduction

Can funds default solely due to their investments in derivatives? In recent years, highly regulated market participants, including mutual funds, were heavily exposed to risk via derivatives. The majority of corporate bond funds in the U.S. that sold more credit default swaps (CDS) protection than they bought suffered severe losses compared to funds that predominantly bought CDS protection during the 2007–2009 financial crisis (*Adam/Guettler* (2015)). The Oppenheimer Champion Income Fund nearly collapsed in 2008 because of speculative investments into CDS and faced lawsuits concerning inadequate disclosure.[1] These developments

[1] See "Recovering Oppenheimer Champion Fund Losses" and "Oppenheimer Champion Income Fund Lawsuits" [http://www.oppenheimerfundfraud.com/id3.html, http://www.youhavealawyer.com/blog/2009/04/16/oppenheimer-champion-income-fund-lawsuits/, respectively, visited on 08.09.2012].

follow from the fact that CDS are not only used for hedging, but also for implementing risky investment strategies that potentially create either high returns or losses. For instance, whenever a fund sells protection via CDS, it effectively adds leverage to its portfolio, because it is exposed to the notional amount of the swaps beyond its total net assets.

This study analyzes the CDS use by U.S. and German funds along with the associated loss potential as defined by U.S. regulation, CDS use-induced risk and performance implications during and around the time period of the 2007–2009 financial crisis. The goal of this study is to determine whether investors in both countries should worry about funds potentially taking extensive risks via derivatives. Although mutual funds are highly regulated in both countries, they can implement speculative strategies by selling CDS, which undermines the effectiveness of investor protection offered by regulation.[2] From the European side, this study focuses on mutual funds distributed in Germany as they follow EU-wide regulation[3] and have been allowed to use credit derivatives since 2004. In addition, mutual funds originating in Germany are obliged to list the cumulated amounts of individual securities sold within the period in annual and semi-annual reports. These data provide unique insights into fund activities within the period. On the contrary, U.S. funds only report the overall portfolio turnover rate.

The purpose of this study is threefold. First, I document the level of CDS use and the regulatory potential for realizing losses via CDS for a sample of U.S. and German corporate bond funds under the regulation existing around the financial crisis. Second, the effect of CDS use on various U.S. and German funds' risk and performance measures during and around the crisis are analyzed. Third, based on period-end and within-period data, which are only available for German funds, I investigate to which extent end-of-period CDS holdings are indicative of a fund's investment behavior during the reporting period.

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[2] Managers, especially those of poorly performing funds (but not exclusively), often face strong incentives to increase the riskiness of their funds as their salary (and position) depends on the development of a fund's assets. It is well documented that managers succeeding in fund tournaments and fund family tournaments attract more inflows from investors and support from a fund family (e.g., *Brown/Harlow/*Starks (1996); *Chevalier/Ellison* (1997); *Taylor* (2003); *Kempf/Ruenzi* (2008); *Kempf/Ruenzi/Thiele* (2009)).

[3] German regulation is based on the UCITS Directive 85/611/EEC, which also applies to public investment funds in other EU countries.

Although many rules are related to the use of derivatives, funds have a high level of flexibility when designing their investment strategies under both U.S. and German regulation: According to *Galkiewicz* (2014), U.S. and German funds might increase their derivative investments up to the point at which it is possible for them to default solely due to derivatives. Thus, losses generated by the Oppenheimer Champion Income Fund in 2008, which reached almost 80 % of its value, were in accordance with the existing regulatory limits on derivative use.

Given the high regulatory flexibility, I analyze the CDS holdings of the 30 largest U.S. and German corporate bond funds (as determined by total net asset value (TNA) in 2004) included in the CRSP and BVI databases as they have the widest investor base.[4] Annual and semi-annual U.S. filings are obtained from the SEC, while German reports are directly provided by the funds. From these reports, I collect data on the funds' net assets as well as the direction, notional and market values of CDS.

The results show that between 2004 and 2010, the use of long and short CDS positions (buying and selling CDS protection) was extensive and increased over time for funds in both countries. However, German funds, which have been allowed to use CDS only since 2004, had significantly higher and more varying CDS positions (measured by CDS notional amounts as a fraction of a fund's TNA) than their U.S. counterparts, especially after EU regulation took full effect in Germany in 2007. As indicated by the negative CDS net notional amounts (long – short positions) at period end, both U.S. and German funds often took on more risk via CDS than they hedged. This was especially pronounced during the 2007–2009 financial crisis where the CDS market peaked (*BIS Quarterly Review* (2004, 2013)). For example, the highest (unrealized) reported loss due to CDS at reporting date equaled -8.10 % (-1.63 %) of TNA for U.S. (German) funds during the crisis. This is substantial given that corporate bond funds generated returns between -2.82 % and 2.97 % during the same time period (Adam and Guettler (2015)). According to U.S. regulation, which measures the loss potential of selling CDS protection by the sum of notional amounts, potential losses reached up to 93.82 % of TNA for U.S. funds (127.04 % of TNA for German funds) during the crisis. Even if these regulatory potential losses are measured more conservatively by negative CDS net notional amounts, they still reached up to

[4] I thank *Lehmann/Stehle* (2013) for kindly providing me with the TNA and return data for German funds.

58.54 % of TNA for U.S. funds (93.19 % of TNA for German funds) during this time.

As opposed to the largest U.S. funds, German funds faced a higher risk exposure and suffered from worse performance due to the enormous selling of credit protection during the crisis. The decrease in returns of German funds during the crisis is accompanied by an increase in standard deviation and idiosyncratic risk. In contrast, U.S. funds staying net short versus long in CDS face lower standard deviation. This differing result might be an outcome of regionally varying investment strategies; however, further research is needed on this topic. As indicated by *Jiang/Zhu* (2015), the largest U.S. bond funds were able to gain leveraged returns based on selling CDS protection (systematically betting) on institutions perceived as "too big or systemic to fail" in anticipation of the negative effect on returns during the crisis. Nevertheless, these authors also warn that the incremental returns from selling CDS protection come at the cost of a "hidden tail risk". This is comparable with selling disaster insurance leaving these funds appearing to produce high alphas. Moreover, they show that smaller funds rather herd in taking on more risk via CDS than buying CDS protection which could lead to potential financial system instability.

In their reports, German funds are obliged to list the cumulated amounts of individual securities sold within the last period (including derivatives). By analyzing within-period data for German funds, I find that the purchases and sales of CDS observable from one period-end to the other only explained a fraction (37.34 %) of the average (or 32.72 % of the median) of aggregate CDS purchases and sales implied by period-end and within-period data. Overall, the above evidence suggests that management undertakes many undetectable round-trip CDS trades (purchases followed by sales or the other way around) within a period. This is concerning given the fact that almost half of the observed cumulative amounts of CDS traded over the course of a period (either small amounts turned over frequently or large amounts turned over infrequently) were higher than a fund's average CDS holdings as implied by period-end data. Interestingly, some funds repeatedly traded CDS in the second half of the calendar year between 2007 and 2010. However, definite conclusions about speculation require information about the portfolio holdings of funds and a wider database.

My analysis reveals potential risks allowed by mutual fund regulation in the U.S. and Germany/the EU with respect to derivative transactions.

In the U.S., the conservatively measured potential for realizing losses by selling CDS protection might become almost as high as a fund's TNA, while in Germany/the EU, it is sometimes even higher. Thus, funds face the possibility to inflate overall leverage by using derivatives, such as CDS, to levels above the value of their net assets, while existing strict direct leverage regulation limits bank borrowing to only 10 % and 33.3 % of a fund's TNA in Germany/the EU and the U.S., respectively. Even if the size of the CDS holdings of the largest U.S. and German funds is in line with regulation, it remains unknown to which extent these holdings are used by funds for speculation. Evidence from this study shows that investors could theoretically lose their entire investment due to a fund's exposure to CDS, if hidden tail risks suddenly materialize. This is of significant importance to regulators and investors alike. Investment strategies pursued by mutual funds should be intensively monitored by regulators and stronger regulation eventually considered.

A large body of literature focuses on the measurement and sources of mutual fund performance, which goes back to *Sharpe* (1966) and *Jensen* (1968). In the last two decades, this stream of literature was extended in the U.S. by the studies of *Elton/Gruber/Blake* (1995), *Carhart* (1997), *Daniel/Grinblatt/Titman/Wermers* (1997), *Wermers* (2000), *Chen/Hong/Huang/Kubik* (2004), *Ingersoll/Spiegel/Goetzmann/Welch* (2007), *Mamaysky/Spiegel/Zhang* (2008), *Comer/Boney/Kelly* (2009), *Gutierrez/Maxwell/Xu* (2009), and *Chen/Ferson/Peters* (2010). Most prominent in Germany are the more recent studies of *Kaserer/Pfau* (1993), *Scherer* (1994), *Kielkopf* (1995), *Steiner/Wittrock* (1994), *Reichling/Trautmann* (1997), *Griese/Kempf* (2003), *Stotz* (2007), *Lehmann*/Stehle (2013), and *Brückner/Lehmann/Schmidt/Stehle* (2015). Most of these studies show that, on average, mutual funds underperform the market. This study adopts a market model approach of *Elton/Gruber/Blake* (1995) rearranged by *Gutierrez/Maxwell/Xu* (2009) and adjusted by *Cici/Gibson* (2012) for German bond funds for the first time.

This study mainly relates to the emerging literature on the purpose and the extent of derivative use by mutual and hedge funds (e.g., *Koski/Pontiff* (1999); *Johnson/Yu* (2004); *Almazan/Brown/Carlson/Chapman* (2004); *Marin/Rangel* (2006); *Chen* (2011); *Aragon/Martin* (2012); *Cici/Palacios* (2015); *Adam/Guettler* (2015); *Jiang/Zhu* (2015); *Natter/Rohleder/Schulte/Wilkens* (2015)). These studies compare the performance and risk characteristics of funds using derivatives with those of nonusers. Most of the mutual fund studies find sporadic evidence that the use

of derivatives affects the performance and/or the risk of the funds using them. For example, lower fund performance of derivative users compared to nonusers is reported for Canadian domestic equity funds (*Johnson/Yu* (2004)), for several categories of Spanish funds (*Marin/Rangel* (2006)), and for U.S. equity mutual funds writing put options (*Cici/Palacios* (2015)). In contrast, *Natter/Rohleder/Schulte/Wilkens* (2015) give evidence that U.S. equity funds using options mainly hedge based on protective puts and covered calls leading to superior risk-adjusted returns and lower systematic risk. The study of *Adam/Guettler* (2015) shows that, in general, there are no significant risk and performance differences between CDS using and non-using U.S. bond funds. Focusing on the same sample funds as *Adam/Guettler* (2015), *Jiang/Zhu* (2015) document that the largest U.S. bond funds are more likely than the smaller ones to take on "hidden tail risk" by selling CDS protection especially on "too big to fail" companies. They claim that through this channel mutual funds contributed to a higher fragility of the financial system between 2007 and 2009.

A few authors ((*Mahieu/Xu* (2007), *Minton/Stulz/Williamson* (2009), *Hirtle* (2009) and *Van Ofwegen/Verschoor/Zwinkels* (2012)) have studied the use of CDS by banks. *Mahieu/Xu* (2007) and *Minton/Stulz/Williamson* (2009) presume that only a small fraction of loans are hedged by banks via CDS, while *Van Ofwegen/Verschoor/Zwinkels* (2012) find higher insolvency risks at European financial institutions using credit derivatives. Fung, Wen, and *Zhang* (2012) document that insurance companies using CDS face greater market risk and suffer from deterioration of financial performance and firm value. However, detailed information about the purpose of using derivatives is limited as empirical observations and data are not widely available. This study contributes to the above literature by providing first insights into the investment behavior of the largest German funds with regard to CDS and by documenting diverging levels of potential losses, risks and returns due to CDS use as compared to their U.S. counterparts during and around the crisis.

The rest of the paper proceeds as follows. Section 2 discusses CDS related strategies. Section 3 presents the U.S. and German/EU regulation of mutual fund leverage and derivative holdings. Section 4 presents the data and section 5 analyzes the CDS use. Finally, section 6 concludes the paper.

II. CDS Related Strategies

CDS are the main form of credit derivatives and can be viewed as default insurance on loans or bonds (*Duffie* (1999)). For protection, a buyer (seller) pays (receives) a premium until the time of the credit event, or the maturity date of the contract (whichever is first). If a defined credit event occurs, the buyer receives the insured notional amount of a bond from the seller (after subtracting the recovery value of the bond); if a triggering event does not take place, the buyer pays the premium until maturity. Due to the fact that selling CDS protection generates high implicit leverage (at low premiums), it is suitable to implement risky investment strategies, which might lead to significant losses. Funds buy and sell various types of CDS that can be classified as single-name CDS (CDS on individual corporate or sovereign bonds), and multi-name CDS (CDS indices, CDS on bond indices and asset-backed securities). As reported by *Mengle* (2007) a major driver of credit derivatives growth since 2004 has been the index CDS. This type of index CDS offers protection on all entities in the index in which each entity has an equal share of the notional amount. If a company included in the index defaults, the buyer of CDS protection is compensated for the loss and the CDS notional amount is reduced by the defaulting company's pro rata share. Depending on the constellation, the following CDS strategies are classified either as hedging or investment strategies predetermined to gain additional exposure to credit risk (e.g. *Adam/Guettler* (2015)).

In the case of bought CDS (protection buyer, long position), one can distinguish between at least four strategies: First, buying CDS on a specific underlying bond without having the underlying bond in the portfolio (naked long CDS) is probably a bet on the deterioration of the creditworthiness of a company. This strategy is speculative in nature and exposes the fund to counterparty risk. Second, buying CDS on an underlying in a portfolio is probably a way to hedge against a value loss of the bond caused by its deteriorating credit quality. Buying CDS on an underlying position that is highly correlated with a bond in the portfolio would be an additional way to hedge against a value loss of the bond, while a high volatility in bought CDS positions could imply speculative strategies. Third, simultaneously buying a bond and CDS on the respective bond can be perceived as a way to exploit temporary spread differences in the CDS market and the bond market, which are due to mispricing or differing counterparty and liquidity risks. Buying CDS at a lower spread than implied by the bond spread (CDS basis = CDS spread – bond spread)

and assuming no default of the counterparty, would be a so-called "negative basis trade" or a way to realize arbitrage gains (e.g. *Oehmke/Zawadowski* (2014)). Fourth, buying CDS at low levels and selling them at high levels of credit risk premia (credit market timing) is a way to exploit interest rate changes over time. In the case of corporate bond funds, one could have bought CDS before the financial crisis of 2007 to 2009 and sold them during the crisis for a gain. Alternatively, funds can buy or sell CDS to offset previously sold or bought CDS positions on exactly the same securities (with the same notional amount, coupon, and maturity) to close existing positions.

For the case of sold CDS (protection seller, short position), two additional strategies should be mentioned: First, selling CDS and investing the notional amount into Treasuries would synthesize a bond or index, e.g., to diversify the portfolio. Additionally, this investment strategy could be the only way, or a cheaper way, to acquire a specific bond depending on market conditions. Second, a levered bond position is created by selling CDS without increasing Treasuries, which is significantly riskier than a regular, unlevered bond position (in addition to its total net assets, the fund is subject to investment exposure on the notional amount of the swaps). If the CDS underlying positions are different from the other holdings, gaining additional exposure could help diversify the portfolio. Nevertheless, this strategy is speculative in nature.

III. Mutual Fund Leverage and Derivative Regulation

According to *Galkiewicz* (2014), funds in both countries can keep derivatives with a notional amount higher than the value of a fund's net assets. Thus, depending on the types of derivatives used, funds in both countries can reach the point at which the default is theoretically possible solely due to their investments into derivatives, e.g., by investing into short CDS with a notional amount equal to (and in Germany/the EU, even higher than) the value of a fund's net assets. For example, funds could sell CDS protection written on, e.g., asset-backed securities (ABS), with a notional amount equal to the amount of their net assets (the other investments of a fund are ignored for the moment). If the underlying positions come under economic pressure as was the case during the last financial crisis, bond funds will be required to pay the notional amount (minus any recovery values of the underlying positions of the CDS) to their contract counterparties. Thus, depending on the engagement of

funds in short CDS as measured by the notional amount and on the size of the recovery values, unfortunate circumstances could destroy a large part, or even the entire value of the fund (*Galkiewicz* (2014)).

In particular, the U.S. and German/EU regulatory frameworks differ in how they regulate the use of derivatives and leverage by funds. In the U.S., bank borrowing is restricted to 33 % of a fund's net assets, while in Germany it is restricted to 10 % of a fund's net assets, which is the only form of direct leverage available to them. However, they can implicitly create a similar effect to explicit borrowing (direct leverage) by investing into derivatives or engaging into securities-lending transactions[5] (indirect leverage). For example, a fund can create implicit leverage equal to the notional amount[6] by selling protection via CDS (short position), which is comparable to borrowing the notional amount from a bank and investing it in the principal of a bond. Funds that build high positions in derivatives could create extensive leverage that eventually leads to liquidity problems and drives them into default. Thus, independent from the limits on direct leverage, U.S. and German funds face limits on derivative use. In the U.S., funds, in general, have to earmark portfolio securities or keep offsetting positions as collateral for all potential obligations to a third party created in their portfolio by securities-lending transactions and derivatives. These include e.g., futures, forwards, written options, and short CDS. Theoretically, under U.S. regulation a fund could, at most, sell protection via CDS with a notional amount equal to the value of its net assets and earmark all its portfolio securities as collateral.

In Germany/the EU, the potential market risk of a fund can be doubled by derivative use as measured by the Value-at-Risk (VaR) determined at 99 % confidence level.[7] Similarly, a fund might sell CDS protection with a notional amount equal to (or even higher than) the value of its net assets as long as its VaR is less than twice as high as a VaR of a comparable fund without derivatives.[8] Thus, by using derivatives, such as short CDS,

[5] E.g., if a fund enters into a repurchase agreement it hands over some of its securities to the counterparty of the transaction and gets instead cash, which is comparable to a collateralized loan.

[6] For derivatives, the notional amount usually reflects the scale of a position with reference to some underlying asset and shows the volume traded during a period of time (McDonald (2009)).

[7] The U.S. approach would be comparable to determining the potential 100 %-portfolio loss via VaR. See Galkiewicz (2014).

[8] Since mid-2011, in addition to the relative VaR, an "absolute" VaR can be calculated (at the 99 % confidence level for a 20-(previously 10)-business-day hold-

a fund can create additional leverage in order to circumvent the more strict restrictions on direct leverage and boost returns. This might be especially tempting, if the performance of a fund lies behind its peers, because of the relative performance-based incentives in the mutual fund industry and given a strong convex flow-to-performance relationship (e.g. *Chevalier/Ellison* (1997)). However, once a credit event specified under the CDS contract materializes, funds are required to pay the notional amount to the counterparty and receive the defaulted bond (or the amount decreased by the cash equivalent of a bond's recovery value); therefore, they might become illiquid due to extensive leverage. As a consequence of the flexibility provided by regulation, it is possible for funds in both countries to lose a large part of their value due to investments in derivatives, such as CDS, alone.[9]

Regarding regulatory disclosure requirements according to the Investment Company Act (ICA) of 1940, U.S. funds are required to inform investors about derivative use in statements of incorporation (Form N-1A), prospectuses, Statements of Additional Information (SAIs), and periodic reports. The statement of incorporation contains information about a fund's intention to use derivatives, while the prospectus comprises information about a fund's current use of derivatives (or alternatively, its intention to use derivatives). The SAI includes general detailed descriptions of a fund's (or a fund family's) derivatives handling (by type). Following general accounting rules, all U.S. funds are required to list their holding positions, including various derivative positions, in the Schedule of Positions in annual, semi-annual and quarterly reports which also contain regular comments in the notes section describing the derivative strategies applied by a fund together with a brief derivative handling. Starting in 2009 the notes contain more detailed information regarding a fund's CDS strategies, the amount at risk, and triggering events. This is

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ing period using parameters from previous year). The new VaR measure is subject to an "absolute" limit of 20 % of the value of the fund. Since mid-2011, UCITS funds also have to hold sufficient liquid funds for cash settled derivatives and the underlying position or sufficient liquid funds for physically settled derivatives (if the underlying asset is highly liquid and can be purchased on the market at any time). However, the exact amount is up to discretion. See *CESR Guidelines* (2010); *Derivative Order/DerivateV* (2011).

[9] For the information contained in this paragraph, refer to *Galkiewicz* (2014), CIL/KAGB (2013), Derivative Order and DerivateV (2011), CESR Guidelines (2010), SEC Concept Release on Derivatives (2011), ICA (1940), SEC Release 10666 (1979).

required by the FAS 133[10], which obliges funds to state the nature and the terms of derivatives, give reasons for entering into those instruments, specify events that require the seller to perform under a contract, and describe the current status of the payment/performance risk with regard to the contract. Moreover, funds have to post information about the aforementioned highest potential amount that the fund could be liable for as a contract seller, the fair value of the contract, and the nature of any recourse provisions/assets held either as collateral or by third parties. The *Appendix* contains an example of comments on CDS provided by a U.S. fund.

By contrast, German funds are required to inform investors about potential derivative use in the terms of the contract contained in the extended prospectuses. Analogously to U.S. funds, German funds are required to list their holding positions, including various derivative positions, in the regular Schedule of Positions in annual and semi-annual reports. The public reports do not contain a notes section and, compared to the U.S., only a brief description of a fund's investment strategy during a reporting period is included. Funds distributed in Germany originating in Germany (as opposed to Luxemburg) are further required to report the aggregated within period sales of all financial positions in a second separate schedule following the Schedule of Portfolio Holdings. Thus, the analysis in section 5.3 remains informative for the largest funds originating in Germany.

Given the level of flexibility provided by regulation, I investigate whether the largest funds in both countries, which have the highest number of investors, expose themselves to potentially high losses via selling CDS protection. The picture is completed by showing how CDS positions affect the risk and performance measures of German and U.S. funds. For this purpose various regulatory loss potential, risk and return measures are defined in the next section.

[10] See FASB Staff Position No. FAS 133-1 and FIN 45-4, "Disclosures about Credit Derivatives and Certain Guarantees: An Amendment of FASB Statement No. 133 and FASB Interpretation No. 45." The amendment extends the interpretation of FASB Statement No. 133 ("FAS 133"), "Accounting for Derivative Instruments and Hedging Activities", and the FASB Interpretation No. 45 ("FIN 45"), "Guarantor's Accounting and Disclosure Requirements for Guarantees, Including Indirect Guarantees of Indebtedness of Others." See FASB ASC 815-10 (2009).

IV. Data

1. Data Description

In order to investigate CDS holdings, the analysis focuses on semi-annual and annual reports of the largest U.S. and German corporate bond funds from 01.07.2004 to 31.12.2010 (13 periods). The term "German funds" refers to funds distributed to investors in Germany originating in Luxemburg or Germany. The sample period starts in 2004 because prior to 2004, German funds were not allowed to use CDS. Since German bond funds only report semi-annually, I only consider the U.S. semi-annual and annual reports. The U.S. reports are either downloaded directly from the SEC webpage or via the EDGARpro database, while German reports are directly provided by the investment companies upon request. To determine the sample of funds, I follow *Adam/Guettler* (2015) by excluding money market funds, treasury funds, municipal funds, mortgage funds, index funds, and fund reports after a merger occurred from the sample. The U.S. funds belong to the following Lipper fund classes: corporate debt funds A-rated, corporate debt funds BBB-rated, short investment grade, short-intermediate investment grade, intermediate investment grade, multi-sector income, and high current yield funds. For the results to be interesting for a wide group of investors and comparable to previous research, the study analyzes the 30 largest corporate bond funds, as determined by TNA, that are included in the CRSP Survivor-Bias-Free U.S. Mutual Fund Database as of the end of the second quarter of 2004; an exact matching of the sample starting date was not possible due to data constraints. Thus, U.S. funds are classified as of June 30, 2004, while German funds as of December 31, 2004. This results in a total of 389 reports, 192 of which contain CDS information.

Table 1 contains the names of the top 30 U.S. corporate bond funds as of the second quarter of 2004 and their respective TNA. The largest fund in the sample is the Total Return Fund of the PIMCO fund family with a TNA of $73 billion, while the smallest fund in the sample is the Sanford C. Bernstein Fund's Intermediate Duration Portfolio with a TNA of $2.7 billion.

Bond funds distributed in Germany are grouped based on the BVI-Classification[11]: fixed income funds investing mainly in Euro; fixed income

[11] See BVI Classification [http://www.bvi.de/fileadmin/user_upload/Statistik/BVI_Abkürzungsverzeichnis.pdf, visited on 24.01.2013], p. 1, 11, 16. All companies

funds investing mainly in German issuers (both may be combined with the sub-classes of short-term bond funds, middle-term bond funds, and long-term bond funds); fixed income funds with variable investments; and fixed income funds, corporate bonds. The German sample is restricted to funds that mainly hold investments in the Euro-Area (U.S. funds focus on U.S. investments). Additionally, fixed maturity funds and funds only invested in money market instruments and government securities are removed to make the sample as comparable as possible to the U.S. sample. Some reports are missing, but they are expected to only have a minor impact on data quality since most of the funds do not hold CDS around the missing dates. Since the reports of Allianz PIMCO Euro Bond Total Return Fund (that would be ranked by TNA as place 16) are not available, I include the next fund. This results in a total of 361 reports from the 30 largest German bond funds, 114 of which contain CDS information. In general, the reports of funds distributed to the German public should be accessible via the "Online Bundesanzeiger", but unfortunately only a few reports can be found on this webpage. End-of-period CDS holdings are provided in 106 of the reports, and the cumulated amounts of CDS turned over within the period are given for an additional 49 of them. Furthermore, the amount of CDS turned over within the half-years are reported for 8 cases without showing any CDS positions at the end of the period. In the 192 U.S. and 114 German fund reports, I search for details regarding CDS positions (i.e., CDS notional amounts of bought and sold positions, market values of CDS and a fund's TNA) in the schedule of portfolio holdings. For the purposes of this study, I aggregate positions at the fund-quarter level and convert Euro amounts into U.S. dollar using the exchange rate for the respective reporting date. Finally, information on total expense ratio (TER), TNA, age and fund flows is collected from CRSP or German fund reports, while data on returns and indices are obtained from Bloomberg, BVI and Datastream.

Table 2 presents the 30 largest funds (as measured by a fund's TNA at the end of 2004 in the BVI database) distributed in Germany. The largest German fund in the sample is the dit-Euro Bond Total Return of the Allianz Global Luxemburg fund family with a TNA of $6.3 billion. The smallest fund is the Deka-CorporateBond Euro with a TNA of $0.591 bil-

represented in Germany, except some small or foreign companies, are members; 99 % of overall funds' TNA is represented by this association. See BVI Jahresbericht 2008, p. 18. According to Lehmann and Stehle (2013) 90 % to 95 % of all investment funds distributed in Germany are captured by this database.

lion. As seen in *Table 1* and *2*, the 30 largest U.S. and German funds significantly differ in terms of size. All U.S. funds are at least four times larger than their German counterparts. This might have an effect on the size of the derivative holdings, which is expected to be higher for larger funds due to cost saving arguments (e.g. *Koski/Pontiff* (1999)).

2. *Regulatory Loss Potential Definition*

Two proxies are determined to gain insight into the lowest and highest regulatory potential fund loss due to CDS (i.e., for the case that all short CDS are triggered and the recovery value of the underlying positions is equal to zero[12]): the notional amount from CDS short positions and the CDS net notional amount. This potential fund loss shows what a fund can lose in addition to the potential 100 % of TNA loss it can suffer from other portfolio investments, and differs from measures reflecting actually realized risk of a fund.

According to U.S. regulation, the notional amount from short CDS positions (short CDS positions) reflects the potential future obligations (future undiscounted payments) a fund must cover. In the absence of long CDS, and if short CDS are used for speculation only, the potential future obligations from CDS indicate the highest possible fund losses over and above its potential losses from other portfolio securities. Additionally, CDS net notional as a common measure of potential obligations that assumes a fund's long and short CDS positions offset each other is used. However, it should be noted that the sample funds seldom hold long and short CDS positions on exactly the same securities in terms of notional amount, coupon, and maturity to cancel existing positions. Regarding leverage regulation, long CDS reflect, in general, negative leverage because using long CDS is equivalent to shorting a bond and investing the notional value of the CDS into Treasury securities. Thus, this proxy also reflects the amount of indirect leverage a fund keeps. The size and direction of the CDS net notional allows an estimation about whether CDS were largely used for hedging (+) or for gaining exposure (-), as suggested by *Adam/Guettler* (2015). When construing these regulatory measures of potential fund obligations, it is implicitly assumed that all short CDS underlying positions could simultaneously fall under economic pressure

[12] In reality, these potential obligations would be partially offset by any recovery values of the referenced debt obligation. However, this assumption is made following U.S. regulation.

even if they comprise CDS written on various single- and multi-name references with differing risk profiles.

3. Risk and Return Measures

Additionally, the typical risk and return characteristics of the funds are evaluated for comparison with the regulatory measures. Following *Adam/Guettler* (2015) the sample period is split up into non-crisis periods and the financial crisis comprising 21 months between July 2007 and March 2009 following *Ben-David/Franzoni/Moussawi* (2012). Afterwards, risk and performance measures are determined for each fund and period, thus, finally delivering 109 and 116 observations for the German and U.S. sample, respectively. In order to investigate the influence of CDS and the crisis period on funds' risk and return data the following measures are considered.

RETURN is the cumulated monthly raw return in one period. *STD* is the standard deviation of monthly returns in one period. *EXCESS RETURN* is a period's total return minus the return on a risk-free asset. For the U.S. sample I use the three-month T-bill rate, while for the German sample, as recommended by Brückner, Lehmann, Schmidt and Stehle (2015), the European Interbank Offered Rate (EURIBOR) is chosen. In fact, German funds do not exclusively invest in German securities and indices, thus, for generating *BETA*, *IDIO* and the *ALPHA* measures European indices are needed.

The market model approach explained below is adopted from a model of *Elton/Gruber/Blake* (1995) rearranged by *Gutierrez/Maxwel/Xu* (2009), who excluded the macroeconomic factors. It is widely used in recent literature, e.g. by *Cici/Gibson* (2012) and *Adam/Guettler* (2015), who changed the order of the factors slightly. After modification the four factor model has the following form: $r_t - r_{f,t} = \alpha + \beta_1 \text{BOND}_t + \beta_2 \text{STK}_t + \beta_3 \text{ABS}_t + \beta_4 \text{DEF}_t + \varepsilon_t$. The first part describes a market model regression: $r_t - r_{f,t} = \alpha + \beta_1(r_{m,t} - r_{f,t}) + \varepsilon_t$.

1ALPHA is the constant α of a market model where the market return expressed by r_m is decreased by the risk-free rate r_f. The bond market return r_m is represented by the return of the *Barclays Capital U.S. Aggregate Bond Index* for the U.S. and *Barclays Capital Euro Aggregate Bond Index* for the German sample, respectively. *BETA* is the systematic risk a fund exhibits on the market in a particular period and captured by β of the market model regression above. *IDIO* is the idiosyncratic risk of the

fund in the respective period and calculated as the standard deviation of the residual of the market model regression above.

3ALPHA is calculated by an extension of the market model by two additional risk factors: β_2 STK_t + β_3 ABS_t. Those factors include an equity index (*STK*), where the index is represented by *S&P 500* for the U.S. and *Eurostoxx 50* for the European market, respectively, decreased by the respective risk-free rate. The third factor (*ABS*) is the yield spread between *Barclays US AGG MBS FHLMC 20 YR* for the U.S. sample and *Barclays EURO AGG Securitized ABS* for the German sample and the risk-free rate.

4ALPHA is extended by one more risk factor β_4 DEF_t which captures default risk and is calculated as the spread between *BARCLAYS US Corp High Yield* and *Barclays Capital U.S. Intermediate Government/ Credit Bond Index* for the U.S. and *BARCLAYS EURO High Yield B & Above* and *Barclays Capital Euro Treasury Bond Index* for the German sample, respectively.

V. Results

First, I document the level of CDS use and the regulatory potential for realizing losses via CDS for U.S. and German corporate bond funds. Second, the effect of CDS use on various U.S. and German funds' risk and performance measures during and around the crisis is analyzed. Third, based on period-end and within-period CDS data, which are only available for German funds, I investigate to which extent the former are representative of a fund's investment behavior within the period.

1. U.S. and German Bond Funds' Use of CDS and Their Potential to Realize Losses

CDS were held by 19 out of the 30 sample U.S. funds in 192 half-years between the end of 2004 and 2010 and by 19 out of the 30 sample German funds in 106 half-years across the same time period as indicated by period-end data. Additionally, 13 German funds list the amount of cumulated CDS notionals sold within the period in 57 half-years in their reports. In the U.S., the number of CDS users increased from 11 in the second half of 2004 to 17 funds in the second half of 2007, and then decreased to 13 funds in 2010. Likewise, the number of CDS users in Germany increased from 1 in the second half of 2004 to 15 funds in the

second half of 2007 and first half of 2008 before it started to vary between 9 and 13 funds after 2008 (*Figure 1*). Funds in both countries usually held many CDS contracts, which were partly written on regional single-name corporate (and seldom sovereign) references and partly on multi-name indices such as the European iTraxx or North American CDX and asset-backed securities. As shown in *Table 3* and *4*, the sum of all CDS positions (long and short CDS) held by U.S. funds over the entire sample period was on average 7.84 % of TNA ($1,181 mio.), compared to 17.33 % of TNA ($175 mio.) in Germany.[13] The largest CDS positions within the observation period were held by the U.S. Fidelity Short-Term Bond Fund (129.09 % of TNA or $33,778 mio.) and Deka-CorporateBond Euro (160.89 % of TNA or $592 mio.). *Figure 2* shows that the total size of the CDS positions increased from an average of 2.28 % in 2004 to 4.58 % of TNA in 2010 for U.S. funds and from 1.56 % to 9.65 % for German funds during the same time period. At the beginning of 2007, after the new EU-wide regulation was fully implemented by the funds registered in Germany, CDS positions increased significantly. Especially after the initiation of CDS use, the average percentage observable for German funds was higher than for U.S. funds. Given the fact that German funds did not have prior experience using CDS, this trend is surprising. Additionally, while U.S. funds reduced their overall CDS positions after the height of the crisis in the second half of 2008, German funds continued to hold substantial CDS positions until mid-2009.

Figure 3 distinguishes between long CDS (protection bought) and short CDS (protection sold) positions as related to a fund's TNA. German funds maintained significantly larger CDS long and short positions than U.S. funds, except in the second half of 2008 where U.S. funds had larger short CDS positions. While U.S. funds started to successively reduce their CDS positions, German funds began to build significant short positions again in 2010. U.S. funds also reduced long positions after 2007 and 2008 when credit risk premia were the highest, while German funds first in-

[13] I report the mean values of CDS for the sample of funds that used CDS, which changes over the selected time period. The mean and median values as presented in *Figures 2* to *4* often differ by a large amount, which is due to outliers. Thus, some average figures overemphasize trends in general CDS use. However, for the purposes of this study, it is more important to estimate what is potentially possible under current regulation, i. e., the results obtained for the extreme cases are of large importance. The analysis of extreme cases shows the shortcomings of mutual fund regulation and a potential lack of protection for bond fund investors.

creased their long CDS positions before reducing them in 2010. *Figure 4* graphs the CDS net positions (long – short) over time, measuring the fund's net exposure to credit risk compared to the credit risk premium (measured by the yield difference between BBB-rated debt and Treasury securities). The CDS net positions for both countries were persistently negative, with the exception of German funds in the second half of 2009. Overall, there were no significant differences between the average net strategies pursued by funds in both countries (*Table 5*) that stayed net short until the end of 2008 when the credit risk premium rose significantly. Hence, in the worst case scenario, if funds used short CDS as a speculative tool (and not for synthesizing bonds) during the financial crisis, this strategy could have led to substantial losses due to the large increase in credit risk premia during this time (see *Figure 4*). The above results are in line with those of *Adam/Guettler* (2015) who find that U.S. bond funds are net sellers of CDS, implying that managers, on average, do not use CDS to hedge credit risk.

In fact, one cannot determine the effect changes in CDS use have on a fund's risk and return profile without taking into account parallel changes in asset allocation or changes in the overall investment strategy of a fund.[14] However, the market (fair) value of CDS (unrealized depreciation/appreciation) shows how much a fund's TNA was negatively/positively affected by CDS contracts at a specific reporting date. This accounting value is more than ten times smaller than the CDS notional amount. As shown in *Table 4*, the average unrealized value for U.S. funds equaled –0.25 % of TNA with the highest value of –8.10 % of TNA observable in the second half of 2008. The values are lower for German funds: The average unrealized value equaled –0.10 % of TNA with the highest value of –1.63 % of TNA observable in the first half of 2009. Given the average return of 0.54 % for U.S. corporate bond funds between 2004 and 2010 (*Adam/Guettler* (2015)), the highest and average unrealized losses in fund value due to CDS observable at reporting date were substantial for both countries.

[14] Recent research provides evidence that sold CDS are mostly perceived as a risk increasing tool: For example, *Van Ofwegen/Verschoor/Zwinkels* (2012) give evidence that banks sell CDS to increase their risk exposure, while Fung, Wen, and Zhang (2012) find that these insurance companies which use CDS face greater market risk and suffer from inferior financial performance leading to lower firm value.

Although definite conclusions about speculation require access to the portfolio holdings of funds, the current data on CDS allow the analysis of the regulatory potential for realizing losses via CDS beyond the potential 100 % of TNA loss the fund can suffer from other portfolio investments.

As *Table 4* shows, the mean (median) short CDS positions of U.S. funds equaled 5.47 % (2.03 %) of TNA for the entire sample period with a peak of 15.14 % observable in the second half of 2008 (*Figure 3*). As shown in *Table 6*, the largest short CDS positions of the top30us funds no. 14 and 24 reached 93.82 % and 61.66 % of TNA, respectively, indicating that if CDS were used for speculative purposes only (not for synthesizing bonds in combination with Treasury securities), potential additional losses from short CDS exposure could have been as high as 93.82 % and 61.66 % of TNA for these two funds. However, the majority of U.S. funds held moderate short CDS positions that did not exceed 15 % of their TNA and did not lead to negative net CDS positions higher than 15 % of their TNA. For U.S. funds, the mean (median) CDS net notional equaled –3.10 % (–1.32 %) of TNA for the entire sample period (*Table 4*). It peaked at –9.89 % in the second half of 2008 and was persistently negative, which indicates that U.S. funds took on more risk than they hedged (see *Figure 4*). For two funds (top30us no. 14 and 24) the negative net notional (and indirect leverage) reached a value of 58.54 % and 54.46 % (*Table 6*), respectively, indicating that, if used for speculative purposes only, these CDS could cause losses as high as 58.54 % and 54.46 % of TNA. However, U.S. funds are generally required by law to be diversified with regard to security issuers (*SEC Concept Release on Derivatives* (2011)). The portfolio holdings of these funds were highly diversified; one of them included "diversified" into its name to attract investors with this feature. Therefore, it might have been beneficial for them to use many short CDS for synthesizing bonds or indices. Indeed, discussions with practitioners confirm that many funds kept higher cash positions in their portfolios during the crisis (especially those facing higher outflows) and used short CDS to increase their exposure to individual names and the broader market. In fact, *Oehmke/Zawadowski* (2014) predict and *Jiang/Zhu* (2015) confirm that U.S. bond funds facing higher trading needs due to more volatile fund flows, rather tend to enter into short CDS positions, if the latter are liquid relative to the underlying bonds, than to buy the underlying bonds.

As shown in *Table 4*, the mean (median) short CDS positions of German funds equaled 10.91 % (5.09 %) of TNA for the entire sample period with a peak of 20.95 % observable in the first half of 2008 (*Figure 3*). As

opposed to U.S. funds, several other German funds presented in *Table 7* (top30de no. 1, 8, 12, and 14) sometimes kept a relatively high amount of short CDS, ca. 40 % of TNA, which led to negative net positions in CDS (and indirect leverage) of around 30 % of TNA at reporting date. Again, since these funds are generally required by law to be highly diversified (*CESR Guidelines* (2010)), it might have been beneficial for them to synthesize bonds or indices via short CDS. However, if CDS were used only for speculative purposes, a German fund's loss from short CDS exposure in the first half of 2008 could have been up to 127.04 % of TNA (top30de fund no. 30) – 1.35 times higher than for an individual U.S. fund. For German funds, the mean (median) CDS net notional equaled –4.48 % (–1.46 %) of TNA for the entire sample period (*Table 4*). It ranged from 21.22 % to –93.19 % of TNA with the largest negative net notional (top30de fund no. 30) and loss potential being 1.6 times higher than for an individual U.S. fund (*Figure 4*).

Figure 5 and *6* compare the Deka-CorporateBond Euro Fund's (top 30de fund no. 30) and the Putnam Diversified Income Trust's (top30us fund no. 14) CDS long and short positions together with their half-year returns between 2004 and 2010. These funds used large amounts of short CDS (127.04 % and 93.82 % of TNA, respectively) in the middle of the crisis and decreased the amounts shortly afterwards to less than 5 % of TNA once performance recovered. Although the potential levels of indirect leverage of 93.19 % and 58.54 % of TNA, respectively, created this way were in line with existing regulation, one can only speculate why these funds used such high levels of CDS. From a credit market timing perspective, increasing short CDS positions until the middle (Deka-CorporateBond Euro) and the end (Putnam Diversified Income Trust) of the crisis such that they surpassed multiple times the size of long CDS at times when the level of credit risk premia was increasing (*Table 4*), possibly led to losses (*Adam/Guettler* (2015)). A large part of the short CDS could have been used to increase the riskiness of the fund and its potential to gain or lose above the usual level as well. Consistent with *Rajan* (2006), *Jiang/Zhu* (2015) show that the largest U.S. bond funds are rather prone to take on "hidden tail risk" by selling CDS contracts than their smaller counterparts. Hence, both German and U.S. funds operating in an environment of unpredictable liquidity needs might have sold CDS protection to synthesize regular bonds and to add risk.

Overall, funds are able to circumvent direct leverage restrictions, which limit bank borrowing to 10 % and 33.3 % of TNA in Germany/the EU and the U.S., respectively. The above findings show that the potential re-

alizable losses from CDS conservatively measured following U.S. regulation could be higher than a fund's net assets in Germany, while in the U.S., they might be almost as high as a fund's TNA. The case of the Oppenheimer Champion Income Fund, which lost 80 % of TNA largely due to derivative use, shows that potential losses from derivatives can materialize. Analyzing the funds' risk and return beyond regulatory loss potential measures might shed new light on the above issues.

2. CDS Use and Its Effect on the Performance and Risk of U.S. and German Funds

Table 8 shows the descriptive statistics of all risk and performance measures of German and U.S. funds between 2004 and 2010. The average return of German funds is positive and higher than that of U.S. funds for the whole observation period. For German funds (U.S. funds), the average *1ALPHA*, *3ALPHA* and *4ALPHA* (*1ALPHA* and *3ALPHA)* measures are negative, indicating that, on average, these funds underperform the market during this time period. In *Table 9* the average risk and performance measures are reported separately for the crisis and non-crisis periods. As shown by *1ALPHA (3ALPHA)*, German funds (U.S. funds) perform slightly better than the market during non-crisis periods, but the result is not robust based on the other performance measures. In general, during the financial crisis the standard deviation increases and return measures turn negative for both sample funds. The average beta decreases significantly during the crisis, i.e. sample funds face less exposure to systematic risk, while the average idiosyncratic risk is higher than in non-crisis periods. However, the economic impact of the crisis on German funds is not as severe as on U.S. funds. The aforementioned trends can be also observed for median risk and return data except that idiosyncratic risk decreases in the crisis period and the return measures remain on a high positive level. This is consistent with median sample funds having been most successful in the past.

Panel A and B of *Table 10* present OLS regressions of German and U.S. risk and performance measures on *CDS use* and interaction of *CDS use* and *Crisis* period dummies, respectively. CDS use does not seem to influence the performance and riskiness of the 30 largest U.S. funds, while for German funds some negative effect on various return measures can be identified during the crisis. However, U.S. funds' risk and return measures are negatively affected by the crisis – an effect that is in line with

the former findings of *Adam/Guettler* (2015). The results further show higher return volatility as well as idiosyncratic risk for both German and U.S. funds during the crisis. As seen in *Table 11*, staying net short as opposed to net long during the crisis only affects the returns of German funds negatively, i.e. decreases them on average by –19 % (at a 10 % significance level). The decrease in returns during the crisis is accompanied by an increase in standard deviation and idiosyncratic risk. This is in line with funds entering into short CDS to earn the premium on sold insurance in order to, for example, hide their bad performance around the crisis. However, because of rising credit risk premia, the unrealized loss from short CDS at that time would possibly negatively affect the value of a fund's net assets during the crisis. In contrast, U.S. funds staying net short in CDS versus long face lower standard deviation. As indicated by *Jiang/Zhu* (2015), the largest U.S. bond funds were able to gain leveraged returns based on selling CDS protection (systematically betting) on institutions perceived as "too big or systemic to fail" in anticipation of the negative effect on returns during the crisis. Nevertheless, these authors also warn that the incremental returns from selling CDS protection come at the cost of a "hidden tail risk". This is comparable with selling disaster insurance leaving these funds appearing to produce high alphas. Moreover, they show that smaller funds rather herd in taking on more risk via CDS than buying CDS protection which could lead to potential instability of the financial system.

Even though both German and U.S. funds stay net short during the crisis, on average, where the risk of default is higher, only German funds suffer from decreased returns due to CDS use during this time. As the pattern identified for German funds is different, the investment strategies and motives for entering into CDS might be regionally diverging as compared to U.S. funds. Based on the above empirical results, one can see that stronger restrictions on the use of CDS would not affect the majority of mutual funds, but could benefit the mutual fund industry as a whole by preventing potentially high losses due to outliers.

Further research should shed light on the within-country variations and relate them to cross-country variations. The trends in CDS use by the 30 largest U.S. funds are in line with the findings of *Adam/Guettler* (2015). I contribute to the derivative literature by providing first evidence for the extent of CDS use by German corporate bond funds and its diverging effects on the regulatory loss potential, various risk and performance measures as compared to their U.S. counterparts.

3. Representativeness of CDS Holdings of German Funds Reported at Period End

One of the main disadvantages of using semi-annual CDS holdings data is that round-trip trades occurring within half of a year (i.e., the purchase and sale of CDS – or the other way around – that takes place between two consecutive reporting dates) are missed. However, gains and losses generated by CDS holdings within the reporting period could have already affected the fund's TNA via the realized gains and losses position. In this case, German data, which specify the level of fund activity within the reporting period, provide additional insights compared to U.S. data. The German reports comprise an initial and second schedule of portfolio holdings; the second schedule shows all transactions closed within the reporting period, including the cumulated CDS sales (reflected by the sum of long and short CDS notional).[15] Analyzing how active funds are in trading CDS within a half-year helps gaining insights into the extent end-of-period CDS holdings are indicative of a fund's investment behavior within the period.

In order to approximate CDS turnover by the number of missed trades, the focus lies on a subsample of 13 German funds that report cumulated within-period sales of CDS in 57 periods. The aggregate sales of CDS capture the decrease in CDS holdings between the past and present reporting dates (i.e., sales of CDS) and within-period CDS trades in which purchases are followed by sales. However, one erroneous observation is deleted. Thus, for the final sample consisting of 56 observations, I define a variable showing missing trades, because turnover ratio data are not available for German funds. *Figure 1* shows that the number of German funds reporting within-period CDS increased from 1 in 2005 to 8 at the end of 2007 before it started to vary between 5 and 8 funds afterwards. This corresponds to the development of the number of funds reporting the use of CDS at period-end, suggesting that some funds repeatedly used CDS in the second half of the calendar year.

The variable missing trades is expressed in percentage of aggregate CDS by subtracting the period-end difference in CDS notional (the absolute value) from either the aggregate sales or purchases (whichever value is higher) and dividing the entire expression by the respective aggregate

[15] Funds originating in other EU countries, such as Luxemburg, are not all required by law to list derivatives in this schedule.

sales or purchases. *Table 12* presents the distribution of the period-end difference in CDS notional, aggregate purchases of CDS, aggregate sales of CDS (within-period) and the missing trades for the 56 observations. Differences in these estimates result from missing round-trip CDS transactions over the half-year. The increase of CDS, implied by period-end data, ranged up to $818 mio., while the decrease of CDS was generally smaller and reached $577 mio. The aggregate CDS purchases ranged from ca. $0.5 mio. to $8,151 mio. and aggregate CDS sales from ca. $4 mio. to $8,186 mio.

The variable missing trades shows that changes in CDS holdings implied by period-end data, on average, reflect 37.34 % of the average (or 32.72 % of the median) of aggregate CDS trades derived from period-end and within-period data. For observations that equal to or lie above the median, between 67.28 % and 100 % of aggregate CDS trades remain undetected; 100 % of aggregate CDS are unobserved whenever a fund undertakes round-trip CDS trades without showing any CDS on reporting date. The variation in this number was large, indicating a high level of heterogeneity across portfolios in terms of CDS use. Thus, almost half of the observed cumulative amounts of CDS traded over the course of a period (either frequently turned over in smaller amounts or infrequently in higher amounts) were higher than a fund's average CDS holdings as implied by period-end data.

Additionally, *Figure 7* shows the development of the median missing CDS trades over time. A high fraction of aggregate CDS trades not explained by period-end differences was observable in every second half of the year between 2007 and 2010. As shown in *Figure 1*, the number of funds reporting CDS within-period also increased in every second half of the year between 2007 and 2010, suggesting that some funds undertook many round-trip CDS trades in the second half of the year. The reasons for this timing remain unclear. These funds might use CDS for portfolio rebalancing or window-dressing at year end (*Elton* et al. (2010)). Further research is needed on this topic.

Overall, almost half of the observed cumulative amounts of CDS sold between the two consecutive reporting dates were higher than a fund's average CDS holdings, as implied by period-end data. The above evidence further suggests that management undertook many round-trip CDS trades (purchases followed by sales or the other way around) within periods that remained undetected, with some funds trading CDS repeatedly in the second half of the calendar year. In particular, funds that in-

creased CDS undertook more undetectable round-trip CDS trades than the funds that decreased CDS during the same time period. Thus, either these funds frequently turned over small amounts of CDS following their general investment policy or misrepresented CDS holdings at period end. Further examination of these issues might be a promising field for further research.

VI. Conclusion

This study analyzes the level of CDS use by U.S. and German corporate bond funds together with the associated regulatory loss potential, risk and performance during and around the financial crisis of 2007–2009. The goal is to determine whether investors need to worry about funds potentially taking extensive risks through the use of CDS. From prior research (e.g., *Galkiewicz* (2014)), it is known that regulation allows funds in the U.S. and Germany to invest into derivatives up to the point at which default is theoretically possible solely due to their investments into these securities.

In general, CDS use was extensive and increased over time for both U.S. and German funds between 2004 and 2010. Although less experienced in using CDS, German funds had higher and more varying CDS positions on the individual fund level since 2007. Especially noticeable is the fact that U.S. and German funds stayed net short and kept the highest levels of CDS selling protection during the middle of the financial crisis. For some funds in the U.S., the regulatory potential for realizing losses via CDS selling protection, as determined by the sum of notional amounts following U.S. law, was almost as high as a fund's TNA, while in Germany, this potential was sometimes even higher than a fund's TNA. The comparison of U.S. and German funds' risk and performance measures reveals that risk increases, while return decreases on average from non-crisis to crisis periods. In the U.S. sample the crisis impact is predominant, while the combined effect of the crisis and CDS net short exposure significantly increases the risks and decreases the returns of German funds. The diverging impact of CDS holdings on the risk and performance measures might be due to varying investment strategies applied in the U.S. and Germany/the EU. The additional analysis of the CDS trading activity of German funds between two consecutive reporting dates suggests that period-end data overlooks many round-trip CDS trades (purchases followed by sales or the other way around) undertaken by

management. Thus, funds are able to circumvent the direct leverage restrictions, which limit bank borrowing to 10 % and 33.3 % of TNA in Germany/the EU and the U.S., respectively, by using CDS.

Overall, the analyses presented document potential limitations of mutual fund regulation in the U.S. and Germany/the EU with respect to CDS and highlight the existence of potentially high (hidden tail) risks. According to *Jiang/Zhu* (2015) the observed herding behavior of U.S. mutual funds towards risk taking via CDS contributed to the instability of the financial system between 2007 and 2009. Based on the aforementioned results, it seems advisable that regulators in both countries monitor and eventually tighten rules restricting the speculative use of derivatives by funds. Given the potential harmful impacts on investors, as witnessed during the financial crisis, these findings are of significant importance for regulators and investors alike.

Appendix

An Example of CDS Related Comments in a U.S. Fund Report

The following Quote presents an excerpt from the notes part of the annual report from August 31, 2010 of the Fidelity Intermediate Bond Fund:

"The Fund entered into credit default swaps as a seller to gain credit exposure to an issuer and/or as a buyer to provide a measure of protection against defaults of an issuer. The issuer may be either a single issuer or a "basket" of issuers. Periodic payments are made over the life of the contract provided that no credit event occurs. For credit default swaps on most corporate and sovereign issuers, credit events include bankruptcy, failure to pay, obligation acceleration or repudiation/moratorium. For credit default swaps on asset-backed securities, a credit event may be triggered by events such as failure to pay principal, maturity extension, rating downgrade or write-down. For credit default swaps on asset-backed securities, the reference obligation described represents the security that may be put to the seller. As a seller, if an underlying credit event occurs, the Fund will either pay the buyer an amount equal to the notional amount of the swap and take delivery of the reference obligation or underlying securities comprising an index or pay a net settlement amount of cash equal to the notional amount of the swap less the recovery value of the reference obligation or underlying securities comprising an index. The notional amount of credit default swaps is included in the Schedule of Investments and approximates the maximum potential amount of future payments that the Fund could be required to make if the Fund is the seller and a credit event were to occur. The total notional amount of all credit default swaps open at period end where the Fund is the seller amounted to $3,990 representing .08 % of net assets." Report (Notes), p. 36–37

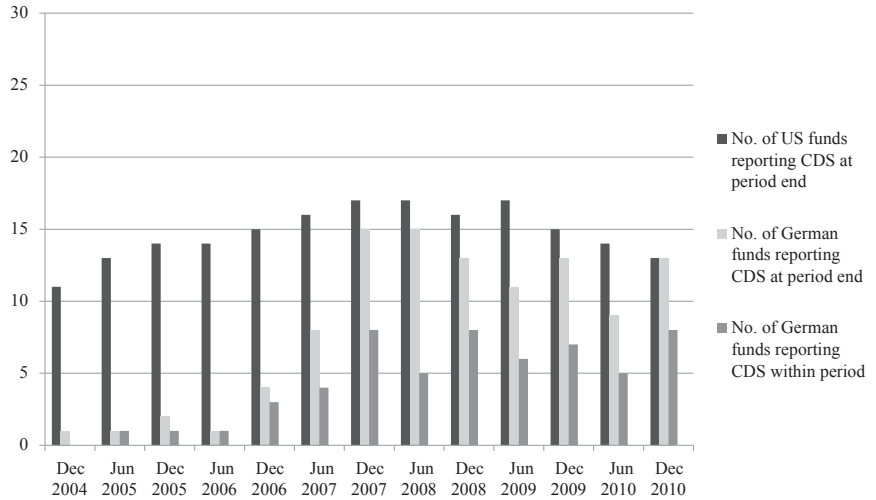

Figure 1: The Development of the Number of U.S. and German Corporate Bond Funds Reporting the Use of CDS Between 2004 and 2010

This figure shows the development of the number of U.S. (US) and German (DE) corporate bond funds that report using CDS at period end and the number of German funds that report using CDS within period between 2004 and 2010. Out of the 30 funds from each country (60 total), 19 funds report using CDS at some point between 2004 and 2010 – 192 times in the U.S. and 106 times in Germany. Additionally, 13 German funds report using CDS occurring within period at some point in the time between 2004 and 2010 (for a total of 57 times). Source: CRSP, BVI, SEC, Bundesanzeiger.

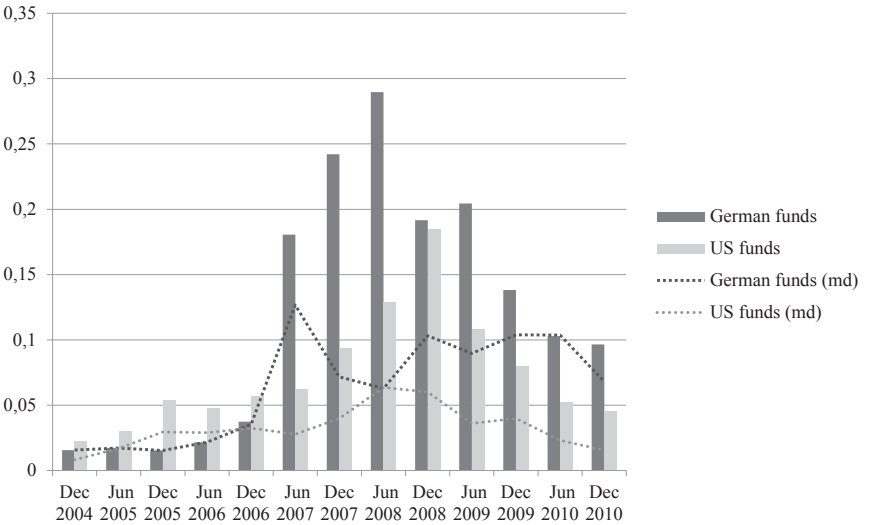

Figure 2: The Development of Total CDS Positions of U.S. and German Funds that Report Using CDS Between 2004 and 2010

This figure shows the average total notional amount of all CDS outstanding divided by total net assets at a particular period end for U.S. and German corporate bond funds. The respective median (md) positions are represented by dotted lines. Source: CRSP, BVI, SEC, Bundesanzeiger.

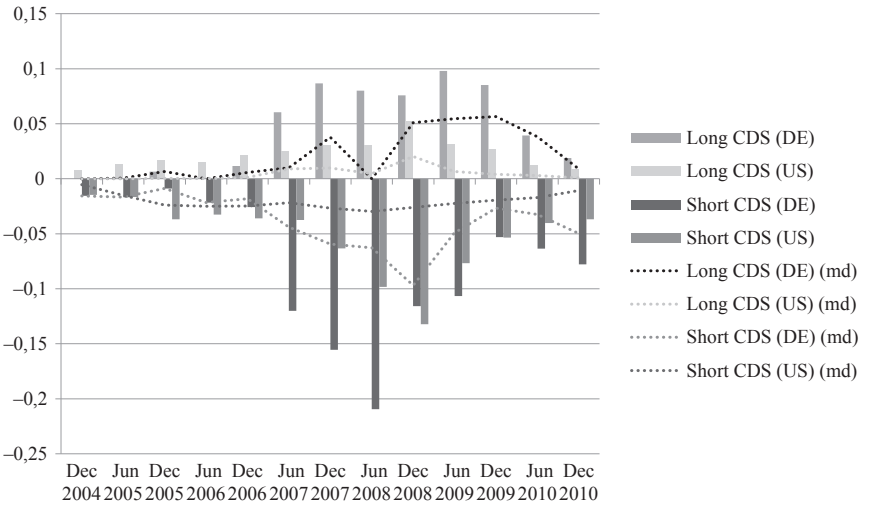

Figure 3: The Development of Long and Short CDS Positions of U.S. and German Corporate Bond Funds Between 2004 and 2010

This figure shows the development of the average CDS long and short positions at a particular period end for U.S. and German funds. CDS notional amounts are normalized by the fund's total net asset value (TNA). The respective median (md) positions are represented by dotted lines.

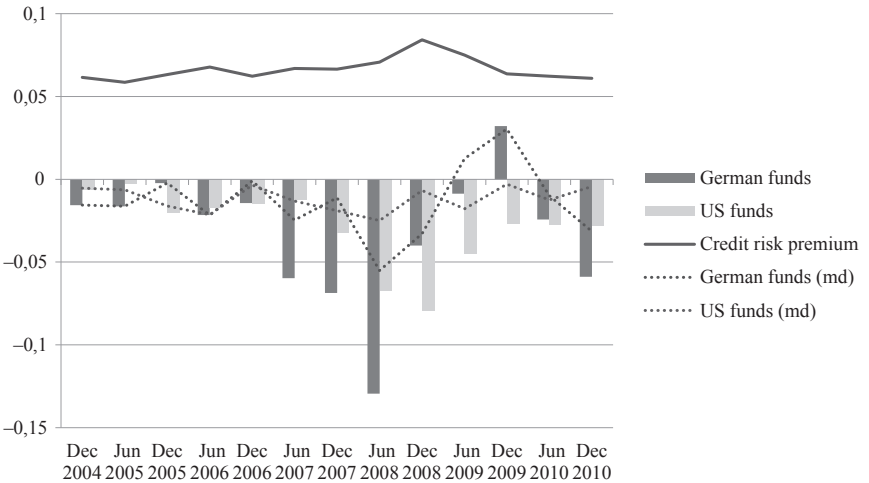

Figure 4: The Development of the Net CDS Positions of U.S. and German Corporate Bond Funds and the Credit Risk Premium

This figure presents the development of the average CDS net notional positions (long CDS – short CDS) as a fraction (frac.) of a fund's TNA for U.S. and German CDS users and the level of the general credit risk premium represented by BBB yield – Treasury yield between 2004 and 2010 at a particular period end. The respective median (md) positions are represented by dotted lines.

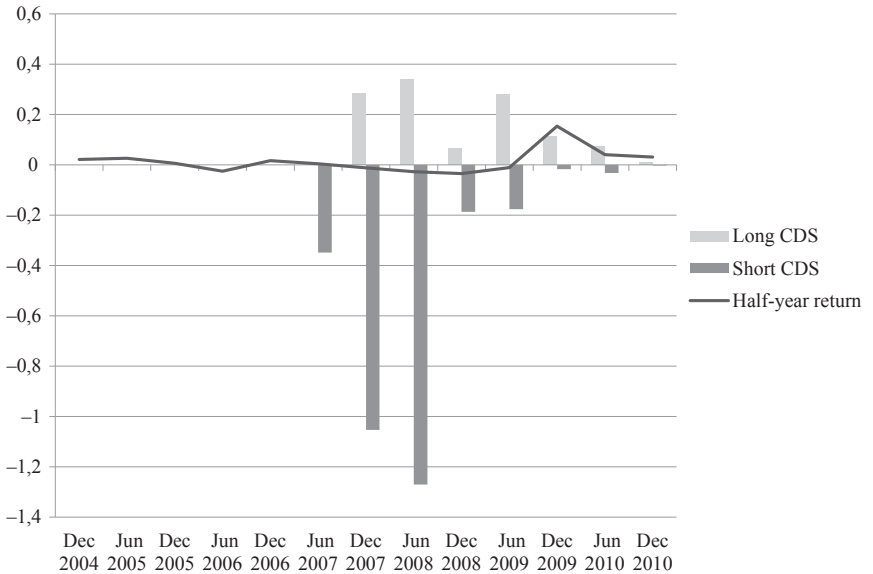

Figure 5: The Development of Long and Short CDS Positions and Half-Year Returns of Deka-CorporateBond Euro (Top30de Fund No. 30)

This figure shows the development of the Deka-CorporateBond Euro fund's CDS long and short positions at a particular period end together with its half-year returns between 2004 and 2010. CDS notional amounts are normalized by the fund's total net assets.

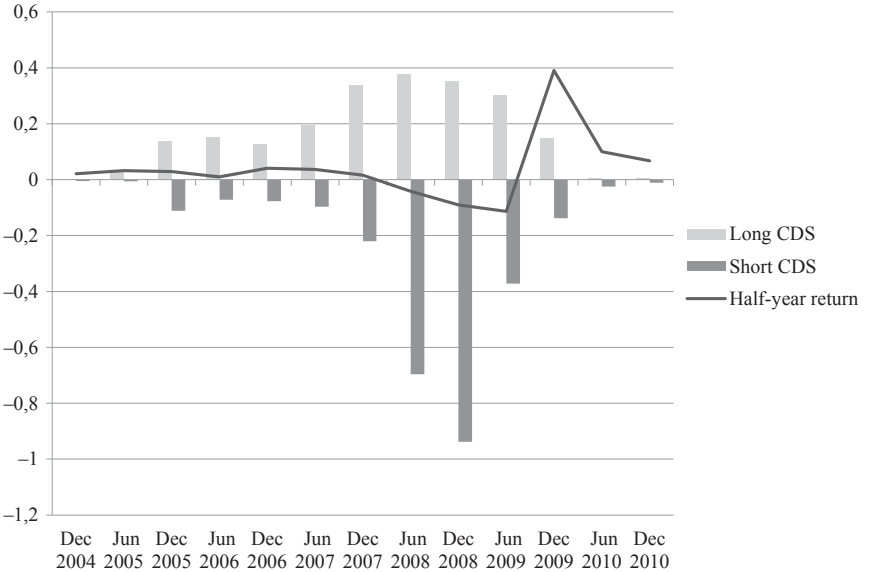

Figure 6: The Development of Long and Short CDS Positions and Half-Year Returns of Putnam Diversified Income Trust (Top30us Fund No. 14)

This figure shows the development of the Putnam Diversified Income Trust's CDS long and short positions at a particular period end together with its half-year returns between 2004 and 2010. CDS notional amounts are normalized by the fund's total net assets.

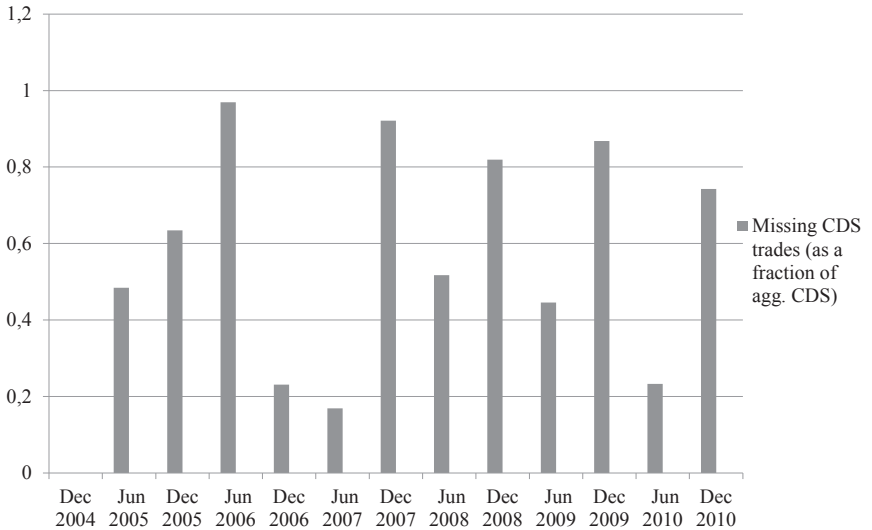

Figure 7: The Development of the Median Number of Missing CDS Trades of German Funds over Time

This figure shows the development of the median number of missing CDS trades as a fraction of aggregate CDS of German funds that report using CDS within period between 2004 and 2010.

Table 1

The Largest U.S. Funds (top30us) as Measured by TNA on June 30, 2004 (CRSP)

No.	*Fund family name: Fund name*	*TNA in mio. $*
1	PIMCO Funds: Pacific Investment Management Series: Total Return Fund	73,202.1
2	Vanguard Fixed Income Securities Funds: Vanguard Short-Term Corporate Fund	17,751.5
3	Bond Fund of America, Inc	17,620.6
4	PIMCO Funds: Pacific Investment Management Series: Low Duration Fund	14,469.9
5	American High-Income Trust	8,895.6
6	Vanguard Fixed Income Securities Funds: Vanguard High-Yield Corporate Fund	8,743.3
7	Lord Abbett Bond-Debenture Fund, Inc	8,211.8
8	Pioneer High Yield Fund, Inc	7,664.5
9	Fidelity Commonwealth Trust: Fidelity Intermediate Bond Fund	6,774.7
10	PIMCO Funds: Pacific Investment Management Series: High Yield Fund	6,759.0
11	Dodge & Cox Income Fund	6,629.0
12	Oppenheimer Strategic Funds Trust: Oppenheimer Strategic Income Fund	6,181.8
13	Fidelity Fixed-Income Trust: Fidelity Investment Grade Bond Fund	5,732.3
14	Putnam Diversified Income Trust	5,533.0
15	Fidelity Fixed-Income Trust: Fidelity Short-Term Bond Fund	5,044.6
16	Intermediate Bond Fund of America	5,039.4
17	Evergreen Select Fixed Income Trust: Evergreen Core Bond Fund	4,517.3
18	Vanguard Fixed Income Securities Funds: Vanguard Long-Term Corporate Fund	4,444.0
19	Vanguard Fixed Income Securities Funds: Vanguard Intermediate-Term Corporate Fund	4,225.9
20	MainStay Funds: MainStay High Yield Corporate Bond Fund	4,225.7
21	Fidelity Summer Street Trust: Fidelity Capital & Income Fund	4,148.9
22	SEI Institutional Managed Trust: Core Fixed Income Portfolio	3,949.2
23	T Rowe Price High Yield Fund, Inc	3,897.0
24	Western Asset Funds, Inc: Western Asset Core Plus Bond Portfolio	3,431.0
25	Putnam High Yield Trust	2,938.0
26	Franklin High Income Trust: AGE High Income Fund	2,849.0
27	AXP Diversified Bond Fund, Inc	2,816.7
28	Fidelity Fixed-Income Trust: High Income Fund	2,785.9
29	Calvert Fund: Calvert Income Fund	2,776.5
30	Sanford C Bernstein Fund, Inc: Intermediate Duration Portfolio	2,691.1

Table 2

The Largest German Funds (top30de) as Measured by TNA on December 31, 2004 (BVI)

No.	*Fund family name: Fund name*	*TNA in mio. $*
1	Allianz GI Lux: dit-Euro Bond Total Return	6,303.1
2	DEKA: RenditDeka	6,166.6
3	DWS: DWS Vermögensbildungsfonds R	4,521.0
4	ACTIVEST LUXEMBOURG S.A.: Activest TotalReturn	3,521.7
5	DWS: DWS Select-Rent	2,837.4
6	DIT: dit-Allianz Rentenfonds	2,707.2
7	DIT: DIT-EURO RENTENFONDS >>K<<	2,662.3
8	UIL S.A.: UniEuroKapital Corporates A	1,855.3
9	DWS S.A.: DWS Euro-Bonds (Medium)	1,817.1
10	GERLING INVESTMENT: Gerling Rendite Fonds	1,680.1
11	DekaLux-Bond	1,451.4
12	DWS S.A.: DWS Euro-Corp Bonds	1,449.5
13	DIT: dit-Allianz Mobil-Fonds	1,425.4
14	UNION S.A.: UniEuroRenta Corporates	1,263.8
15	UNION S.A.: UniPlusKapital DM (Lux)	1,254.4
16	DEKA: DekaTresor	997.2
17	Ring-Rentenfonds DWS	921.9
18	DIT-EURO RENTENFONDS	919.4
19	MEAG EuroRent	875.6
20	UIP: UniEuroRenta	873.5
21	DWS Inrenta	840.5
22	DWS Invest Euro Bonds (Short) FC	761.1
23	DWS Euro-Bonds (Short)	747.4
24	Union Investment Lux.: UniEuroKapital II	746.7
25	UIP: UniEuroRenta Absolute Return	710.5
26	WestAM: Mundo I Invest	709.7
27	MEAG ProRent	702.5
28	FRANKFURT-TRUST: Basis-Fonds I	664.0
29	DWS Euro-Bonds (Long)	596.4
30	Deka-CorporateBond Euro	591.8

Table 3: **Summary Statistics**

This table reports summary statistics for the total net asset value (TNA), CDS notional (sum of long and short positions), long CDS notional, short CDS notional, CDS net notional (long – short positions), and the unrealized value change in mio. $ of German and U.S. funds that reported using CDS in a particular half-year between 2004 and 2010. 19 out of the 30 U.S. funds report using CDS 192 times, and 19 out of the 30 German funds report using CDS 106 times.

Country	*Variable*	*N*	*mean*	*sd*	*min*	*p25*	*p50*	*p75*	*max*
Germany	TNA (in mio. $)	106	1,627	1,928	239	673	1,002	1,600	10,383
	CDS notional (in mio. $)	106	175	230	1	42	96	230	1,383
	Long CDS notional (in mio. $)	106	75	161	0	0	33	99	1,169
	Short CDS notional (in mio. $)	106	100	123	0	15	59	141	562
	CDS net notional (in mio. $)	106	–25	172	–458	–94	–17	23	1,079
	Unrealized value change (in mio. $)	106	0	3	–8	–1	0	0	14
	CDS use	106	1	0					
USA	TNA (in mio. $)	192	16,076	34,457	781	4,515	7,005	10,134	252,184
	CDS notional (in mio. $)	192	1,181	3,657	1	62	221	668	33,778
	Long CDS notional (in mio. $)	192	289	1,001	0	0	17	163	11,118
	Short CDS notional (in mio. $)	192	893	2,937	0	32	156	483	31,059
	CDS net notional (in mio. $)	192	–604	2,425	–28,341	–358	–88	–4	393
	Unrealized value change (in mio. $)	192	–25	127	–1,172	–8	0	1	252
	CDS use	192	1	0					
Total	TNA (in mio. $)	298	10,936	28,511	239	1,331	4,624	7,760	252,184
	CDS notional (in mio. $)	298	823	2,975	1	52	149	405	33,778
	Long CDS notional (in mio. $)	298	212	815	0	0	22	125	11,118
	Short CDS notional (in mio. $)	298	611	2,387	0	21	102	303	31,059
	CDS net notional (in mio. $)	298	–398	1,967	–28,341	–225	–38	1	1,079
	Unrealized value change (in mio. $)	298	–16	102	–1,172	–3	0	0	252
	CDS use	298	1	0					

Table 4: **Summary Statistics**

This table reports summary statistics for CDS notional (sum of long and short positions), long CDS notional, short CDS notional, CDS net notional (long – short positions), and the unrealized value change as a fraction of a fund's total net asset value (TNA) (in %) of German and U.S. funds that report using CDS in a particular half-year between 2004 and 2010. 19 out of the 30 U.S. funds report using CDS 192 times, and 19 out of the 30 German funds report using CDS 106 times.

Country	*Variable*	*N*	*mean*	*sd*	*min*	*p25*	*p50*	*p75*	*max*
Germany	CDS notional (in % of TNA)	106	17.33 %	25.05 %	0.05 %	2.96 %	7.86 %	21.75 %	160.89 %
	Long CDS notional (in % of TNA)	106	6.43 %	9.12 %	0.00 %	0.00 %	1.93 %	10.37 %	41.04 %
	Short CDS notional (in % of TNA)	106	10.91 %	18.50 %	0.00 %	1.38 %	5.09 %	12.16 %	127.04 %
	CDS net notional (in % of TNA)	106	–4.48 %	14.94 %	–93.19 %	–7.49 %	–1.46 %	2.18 %	21.22 %
	Unrealized value change (in % of TNA)	106	–0.10 %	0.28 %	–1.63 %	–0.11 %	–0.03 %	0.00 %	0.50 %
USA	CDS notional (in % of TNA)	192	7.84 %	15.75 %	0.02 %	0.87 %	2.95 %	7.67 %	129.09 %
	Long CDS notional (in % of TNA)	192	2.37 %	5.65 %	0.00 %	0.00 %	0.36 %	2.18 %	37.71 %
	Short CDS notional (in % of TNA)	192	5.47 %	11.12 %	0.00 %	0.48 %	2.03 %	5.96 %	93.82 %
	CDS net notional (in % of TNA)	192	–3.10 %	7.95 %	–58.54 %	–3.51 %	–1.32 %	–0.08 %	11.92 %
	Unrealized value change (in % of TNA)	192	–0.25 %	0.83 %	–8.10 %	–0.16 %	0.00 %	0.01 %	0.68 %
Total	CDS notional (in % of TNA)	298	11.21 %	20.05 %	0.02 %	1.50 %	4.17 %	10.96 %	160.89 %
	Long CDS notional (in % of TNA)	298	3.81 %	7.33 %	0.00 %	0.00 %	0.50 %	3.60 %	41.04 %
	Short CDS notional (in % of TNA)	298	7.40 %	14.40 %	0.00 %	0.73 %	2.50 %	7.55 %	127.04 %
	CDS net notional (in % of TNA)	298	–3.59 %	10.95 %	–93.19 %	–4.97 %	–1.40 %	0.05 %	21.22 %
	Unrealized value change (in % of TNA)	298	–0.19 %	0.69 %	–8.10 %	–0.14 %	–0.01 %	0.01 %	0.68 %

Table 5

T-test for Differences in Means of CDS Holdings of U.S. and German Funds

This table reports the results of the t-test for differences in means of CDS holdings of U.S. and German bond funds that report using CDS in a particular half-year between 2004 and 2010. Panel A provides results for the following variables: CDS notional (sum of long and short positions), long CDS notional, short CDS notional, CDS net notional (long – short positions), and the unrealized value change expressed in absolute dollar terms, while Panel B reports results for the same variables expressed as a fraction of a fund's total net asset value (TNA). The last column reports p-values of Levene's test for the equality of group variances. *, **, and *** indicate statistical significance at the 10 %, 5 %, 1 % level. Standard errors are presented in brackets.

Variable	*German funds*	*U.S. funds*	*Difference*	*(d_se)*	*Levene's test (p-value)*
Panel A: Variables in mio. $					
TNA (in mio. $)	1,626.6800	16,076.2200	–14,449.5400***	(2493.7600)	(0.0000)
CDS notional (in mio. $)	174.6153	1,181.0810	–1,006.465***	(246.8322)	(0.0000)
Long CDS notional (in mio. $)	74.6085	288.5282	–213.9197***	(73.9182)	(0.0003)
Short CDS notional (in mio. $)	100.0068	892.5524	–792.5456***	(212.2812)	(0.0000)
CDS net notional (in mio. $)	–25.3983	–604.0242	578.6259***	(175.8362)	(0.0007)
Unrealized value change (in mio. $)	–0.4031	–24.5986	24.1955***	(9.1378)	(0.0000)
Panel B: Variables as a frac. of TNA					
CDS notional (as a frac. of TNA)	0.1733	0.0784	0.0950***	(0.0269)	(0.0000)
Long CDS notional (as a frac. of TNA)	0.0643	0.0237	0.0406***	(0.0097)	(0.0000)
Short CDS notional (as a frac. of TNA)	0.1091	0.0547	0.0544***	(0.0197)	(0.0003)
CDS net notional (as a frac. of TNA)	–0.0448	–0.0310	–0.0138	(0.0156)	(0.0000)
Unrealized value change (as a frac. of TNA)	–0.0010	–0.0024	0.0014**	(0.0007)	(0.0012)

Table 6

Summary Statistics for Individual Top30us Funds Listed in Table 1

This table reports summary statistics for short CDS notional and CDS net notional (long – short positions) as a fraction of a fund's total net asset value (in %) of U.S. funds that report using CDS in a particular half-year between 2004 and 2010.

Top30us	*Variable*	*N*	*mean*	*sd*	*p50*	*p75*	*max*
1	Short CDS (in % of TNA)	13	4.99 %	3.69 %	4.80 %	7.14 %	12.32 %
2	Short CDS (in % of TNA)	13	1.15 %	0.71 %	1.35 %	1.54 %	2.31 %
4	Short CDS (in % of TNA)	13	5.31 %	3.76 %	3.90 %	7.96 %	13.19 %
7	Short CDS (in % of TNA)	4	0.17 %	0.13 %	0.20 %	0.27 %	0.27 %
9	Short CDS (in % of TNA)	13	1.69 %	1.14 %	1.79 %	2.51 %	3.66 %
10	Short CDS (in % of TNA)	13	8.89 %	4.51 %	9.22 %	11.94 %	15.69 %
12	Short CDS (in % of TNA)	11	4.36 %	4.61 %	2.28 %	10.42 %	11.56 %
13	Short CDS (in % of TNA)	13	2.51 %	1.28 %	2.67 %	2.96 %	5.42 %
14	Short CDS (in % of TNA)	13	21.30 %	29.08 %	9.72 %	22.01 %	93.82 %
15	Short CDS (in % of TNA)	13	1.96 %	2.75 %	1.70 %	2.09 %	10.57 %
17	Short CDS (in % of TNA)	5	3.24 %	2.59 %	3.26 %	5.33 %	6.26 %
18	Short CDS (in % of TNA)	4	5.51 %	0.94 %	5.18 %	6.04 %	6.89 %
19	Short CDS (in % of TNA)	13	0.36 %	0.20 %	0.37 %	0.49 %	0.73 %
22	Short CDS (in % of TNA)	11	1.82 %	1.49 %	1.93 %	2.73 %	4.95 %
23	Short CDS (in % of TNA)	8	0.46 %	0.30 %	0.43 %	0.64 %	0.97 %
24	Short CDS (in % of TNA)	13	22.37 %	16.95 %	16.77 %	30.25 %	61.66 %
25	Short CDS (in % of TNA)	11	1.73 %	1.35 %	1.86 %	2.92 %	3.79 %
27	Short CDS (in % of TNA)	5	0.09 %	0.15 %	0.00 %	0.10 %	0.36 %
30	Short CDS (in % of TNA)	3	0.95 %	1.64 %	0.00 %	2.84 %	2.84 %
Total	Short CDS (in % of TNA)	192	5.47 %	11.12 %	2.03 %	5.96 %	93.82 %

Variable	*N*	*mean*	*sd*	*p50*	*min*	*max*
Net notional (in % of TNA)	13	–3.03 %	3.45 %	–1.61 %	–11.24 %	0.09 %
Net notional (in % of TNA)	13	–0.97 %	0.94 %	–1.35 %	–2.31 %	0.42 %
Net notional (in % of TNA)	13	–4.66 %	3.65 %	–3.08 %	–13.11 %	–0.42 %
Net notional (in % of TNA)	4	–0.04 %	0.17 %	0.00 %	–0.27 %	0.13 %
Net notional (in % of TNA)	13	–1.69 %	1.14 %	–1.79 %	–3.66 %	–0.08 %
Net notional (in % of TNA)	13	–6.57 %	3.73 %	–7.06 %	–12.44 %	0.23 %
Net notional (in % of TNA)	11	–1.86 %	5.48 %	–0.03 %	–10.28 %	6.33 %
Net notional (in % of TNA)	13	–1.82 %	1.63 %	–1.52 %	–5.37 %	0.42 %
Net notional (in % of TNA)	13	–4.60 %	19.50 %	1.11 %	–58.54 %	11.92 %
Net notional (in % of TNA)	13	–1.93 %	2.73 %	–1.70 %	–10.50 %	–0.02 %
Net notional (in % of TNA)	5	–0.06 %	6.71 %	–2.02 %	–5.80 %	11.11 %
Net notional (in % of TNA)	4	–5.40 %	0.92 %	–5.08 %	–6.74 %	–4.69 %
Net notional (in % of TNA)	13	–0.22 %	0.12 %	–0.20 %	–0.39 %	–0.03 %
Net notional (in % of TNA)	11	0.22 %	1.11 %	–0.01 %	–2.08 %	1.76 %
Net notional (in % of TNA)	8	–0.36 %	0.52 %	–0.43 %	–0.97 %	0.80 %
Net notional (in % of TNA)	13	–16.35 %	16.22 %	–12.71 %	–54.46 %	0.62 %
Net notional (in % of TNA)	11	–1.24 %	1.31 %	–0.54 %	–3.43 %	–0.01 %
Net notional (in % of TNA)	5	0.42 %	0.35 %	0.51 %	0.00 %	0.75 %
Net notional (in % of TNA)	3	1.19 %	3.50 %	2.84 %	–2.84 %	3.56 %
Net notional (in % of TNA)	192	–3.10 %	7.95 %	–1.32 %	–58.54 %	11.92 %

Table 7

Summary Statistics for Individual Top30de Funds Listed in Table 2

This table reports summary statistics for short CDS notional, and CDS net notional (long – short positions) as a fraction of a fund's total net asset value (in %) of German funds that report using CDS in a particular half-year between 2004 and 2010.

Top30de	*Variable*	*N*	*mean*	*sd*	*p50*	*p75*	*max*
1	Short CDS (in % of TNA)	13	7.75 %	10.52 %	2.40 %	7.55 %	36.66 %
2	Short CDS (in % of TNA)	8	1.01 %	0.94 %	1.24 %	1.50 %	2.58 %
3	Short CDS (in % of TNA)	1	0.00 %	.	0.00 %	0.00 %	0.00 %
4	Short CDS (in % of TNA)	1	1.23 %	.	1.23 %	1.23 %	1.23 %
5	Short CDS (in % of TNA)	2	1.58 %	0.21 %	1.58 %	1.73 %	1.73 %
6	Short CDS (in % of TNA)	6	7.95 %	5.45 %	5.59 %	12.95 %	16.41 %
7	Short CDS (in % of TNA)	6	3.47 %	2.27 %	3.37 %	5.44 %	6.60 %
8	Short CDS (in % of TNA)	8	15.16 %	13.25 %	13.45 %	23.54 %	38.91 %
9	Short CDS (in % of TNA)	7	10.53 %	1.27 %	10.85 %	11.47 %	12.16 %
10	Short CDS (in % of TNA)	1	0.37 %	.	0.37 %	0.37 %	0.37 %
11	Short CDS (in % of TNA)	7	2.31 %	2.38 %	1.20 %	5.21 %	5.40 %
12	Short CDS (in % of TNA)	7	31.95 %	14.24 %	37.08 %	43.10 %	46.91 %
13	Short CDS (in % of TNA)	8	8.08 %	8.58 %	5.67 %	10.13 %	27.05 %
14	Short CDS (in % of TNA)	8	13.30 %	14.24 %	8.47 %	23.22 %	39.89 %
16	Short CDS (in % of TNA)	3	1.65 %	0.64 %	1.47 %	2.36 %	2.36 %
18	Short CDS (in % of TNA)	3	5.33 %	7.28 %	2.36 %	13.62 %	13.62 %
20	Short CDS (in % of TNA)	4	0.03 %	0.05 %	0.00 %	0.05 %	0.11 %
23	Short CDS (in % of TNA)	5	7.65 %	1.63 %	7.49 %	8.87 %	9.69 %
30	Short CDS (in % of TNA)	8	38.59 %	49.58 %	18.16 %	70.09 %	127.04 %
Total	Short CDS (in % of TNA)	106	10.91 %	18.50 %	5.09 %	12.16 %	127.04 %

Variable	*N*	*mean*	*sd*	*p50*	*min*	*max*
Net notional (in % of TNA)	13	–0.93 %	13.99 %	–0.74 %	–34.87 %	20.18 %
Net notional (in % of TNA)	8	2.69 %	3.37 %	3.90 %	–2.58 %	6.12 %
Net notional (in % of TNA)	1	3.78 %	.	3.78 %	3.78 %	3.78 %
Net notional (in % of TNA)	1	–1.23 %	.	–1.23 %	–1.23 %	–1.23 %
Net notional (in % of TNA)	2	–1.58 %	0.21 %	–1.58 %	–1.73 %	–1.44 %
Net notional (in % of TNA)	6	–5.95 %	6.12 %	–5.37 %	–14.76 %	3.03 %
Net notional (in % of TNA)	6	–3.47 %	2.27 %	–3.37 %	–6.60 %	–0.90 %
Net notional (in % of TNA)	8	–6.50 %	10.80 %	–1.26 %	–28.21 %	1.52 %
Net notional (in % of TNA)	7	–10.53 %	1.27 %	–10.85 %	–12.16 %	–8.28 %
Net notional (in % of TNA)	1	–0.37 %	.	–0.37 %	–0.37 %	–0.37 %
Net notional (in % of TNA)	7	3.83 %	6.60 %	4.26 %	–5.40 %	10.38 %
Net notional (in % of TNA)	7	–10.34 %	17.49 %	–14.04 %	–27.61 %	21.22 %
Net notional (in % of TNA)	8	1.84 %	5.57 %	2.96 %	–8.44 %	9.21 %
Net notional (in % of TNA)	8	–3.30 %	9.36 %	–0.78 %	–24.05 %	7.22 %
Net notional (in % of TNA)	3	–1.65 %	0.64 %	–1.47 %	–2.36 %	–1.12 %
Net notional (in % of TNA)	3	–4.60 %	8.13 %	–2.36 %	–13.62 %	2.18 %
Net notional (in % of TNA)	4	1.41 %	2.77 %	0.08 %	–0.07 %	5.57 %
Net notional (in % of TNA)	5	–7.65 %	1.63 %	–7.49 %	–9.69 %	–5.93 %
Net notional (in % of TNA)	8	–24.04 %	40.62 %	–5.72 %	–93.19 %	10.32 %
Net notional (in % of TNA)	106	–4.48 %	14.94 %	–1.46 %	–93.19 %	21.22 %

Table 8

Distribution of Risk and Performance Measures of German and U.S. Funds Between Mid-2004 and 2010

This table reports in Panel A (Panel B) the distribution of risk and performance measures of the top 30 German funds (top 30 U.S. funds) between 2004–2010. Refer to Table 1 and 2 for the German and U.S. sample selection process, respectively. All the measures are on a monthly basis if appropriate. *RETURN* is the cumulated monthly raw fund return, while *EXCESS RETURN* is a period's total return decreased by the return on a risk-free asset. *STD* is the standard deviation of the fund returns. *IDIO* is the unsystematic risk measured by the standard deviation of the residual terms of the market model regression, which is a regression of the daily fund returns in excess of the risk-free rate on a constant and the daily returns of the Barclays Capital U.S. or Euro Aggregate Bond Index in excess of the risk-free rate. *BETA* is the systematic risk measured by the beta coefficient of the market model regression. 1*ALPHA* is the market model alpha measured by the constant of the market model regression. 3*ALPHA* is the alpha of the three-factor model using the aggregate bond market, the stock market, and an asset-backed securities (mortgage market) factor. 4*ALPHA* is the alpha of the four-factor model using the aggregate bond market, the stock market, and an asset-backed securities (mortgage market) factor and a default factor. For further information please refer to section 4.2. *, **, and *** indicate significance at the 10 %, 5 %, and 1 % levels, respectively.

Top30de	*Variable*	*N*	*mean*	*sd*	*p50*	*min*	*max*
Panel A	*Germany*						
Total	RETURN	111	0.0494	0.0504	0.0812	–0.2097	0.2936
	EXCESS RETURN	111	0.0034	0.0085	0.0910	–0.2652	0.2744
	STD	111	0.0075	0.0066	0.0039	0.0018	0.0172
	BETA	111	0.6550	0.7231	0.3235	–0.0271	1.1962
	IDIO	111	0.0042	0.0029	0.0035	0.0005	0.0158
	1ALPHA	111	–0.0008	–0.0005	0.0034	–0.0146	0.0082
	3ALPHA	111	–0.0028	–0.0026	0.0042	–0.0154	0.0060
	4ALPHA	111	–0.0032	–0.0029	0.0037	–0.0141	0.0038

Top30us	*Variable*	*N*	*mean*	*sd*	*p50*	*min*	*max*
Panel B	*USA*						
Total	RETURN	116	0.0286	–0.0235	0.2788	–0.5771	0.9302
	EXCESS RETURN	116	–0.0098	–0.0553	0.2709	–0.5911	0.9258
	STD	116	0.0154	0.0139	0.0075	0.0039	0.0373
	BETA	116	0.1087	0.0965	0.3700	–1.0363	1.0360
	IDIO	116	0.0150	0.0139	0.0074	0.0031	0.0377
	1ALPHA	116	–0.0024	–0.0027	0.0127	–0.0415	0.0283
	3ALPHA	116	–0.0007	–0.0013	0.0123	–0.0432	0.0334
	4ALPHA	116	0.0057	0.0036	0.0191	–0.0318	0.1194

Table 9

Distribution of Risk and Performance Measures of German and U.S. Funds Subdivided into Non-crisis and Crisis Period

This table reports in Panel A (Panel B) the distribution of risk and performance measures of the top 30 German funds (top 30 U.S. funds) subdivided into non-crisis and crisis period (2007M07–2009M03; as determined following *Ben-David/Franzoni/Moussawi* (2012)). The non-crisis period consists of the pre- (2004M01–200509; 200510–2007M06) and post-crisis periods (2009M04–2010M12). For further information please refer to Table 8 and section 4.2. A t-test for differences in means of the aforementioned variables between the crisis and the non-crisis periods in the respective country is used and the p-values are reported in column T-test. *, **, and *** indicate significance at the 10 %, 5 %, and 1 % levels, respectively.

Top30de	*Variable*	*N*	*mean*	*sd*	*p50*	*min*	*max*	*T–test*
Panel A	*Germany*							
Non-crisis period	RETURN	83	0.0618	0.0522	0.0721	–0.0556	0.2936	0.0179
	EXCESS RET.	83	0.0241	0.0193	0.0823	–0.1076	0.2744	0.0001
	STD	83	0.0067	0.0062	0.0036	0.0018	0.0172	0.0000
	BETA	83	0.6861	0.7547	0.3279	–0.0271	1.1962	0.0000
	IDIO	83	0.0032	0.0023	0.0027	0.0005	0.0137	0.0000
	1ALPHA	83	0.0002	–0.0003	0.0021	–0.0034	0.0082	0.0000
	3ALPHA	83	–0.0024	–0.0026	0.0035	–0.0133	0.0053	0.0000
	4ALPHA	83	–0.0026	–0.0026	0.0032	–0.0126	0.0038	0.0000
Crisis period	RETURN	28	0.0128	0.0433	0.0960	–0.2097	0.1897	
	EXCESS RET.	28	–0.0577	–0.0292	0.0896	–0.2652	0.1075	
	STD	28	0.0100	0.0105	0.0037	0.0037	0.0162	
	BETA	28	0.5628	0.5379	0.2965	0.0937	1.0811	
	IDIO	28	0.0072	0.0062	0.0040	0.0020	0.0158	
	1ALPHA	28	–0.0036	–0.0021	0.0046	–0.0146	0.0040	
	3ALPHA	28	–0.0042	–0.0024	0.0056	–0.0154	0.0060	
	4ALPHA	28	–0.0048	–0.0036	0.0044	–0.0141	0.0033	

(To be continued on the next page)

Table 9: Continued

Top30us	*Variable*	*N*	*mean*	*sd*	*p50*	*min*	*max*	*T–test*
Panel B	*USA*							
Non-crisis period	RETURN	87	0.0643	–0.0020	0.2867	–0.4768	0.9302	0.0079
	EXCESS RET.	87	0.0231	–0.0278	0.2796	–0.4956	0.9258	0.0115
	STD	87	0.0142	0.0127	0.0075	0.0039	0.0373	0.0000
	BETA	87	0.1194	0.1148	0.4059	–1.0363	1.0360	0.0000
	IDIO	87	0.0138	0.0124	0.0075	0.0031	0.0377	0.0000
	1ALPHA	87	–0.0008	–0.0018	0.0126	–0.0333	0.0283	0.0000
	3ALPHA	87	0.0006	–0.0001	0.0123	–0.0294	0.0334	0.0001
	4ALPHA	87	0.0052	0.0031	0.0203	–0.0300	0.1194	0.0000
Crisis period	RETURN	29	–0.0784	–0.1000	0.2257	–0.5771	0.4182	
	EXCESS RET.	29	–0.1084	–0.1293	0.2186	–0.5911	0.3725	
	STD	29	0.0189	0.0181	0.0061	0.0102	0.0336	
	BETA	29	0.0765	0.0671	0.2342	–0.4640	0.6610	
	IDIO	29	0.0186	0.0178	0.0059	0.0101	0.0323	
	1ALPHA	29	–0.0069	–0.0067	0.0119	–0.0415	0.0129	
	3ALPHA	29	–0.0048	–0.0066	0.0118	–0.0432	0.0140	
	4ALPHA	29	0.0072	0.0095	0.0153	–0.0318	0.0321	

Table 10: **Determinants of Fund Risk and Return: CDS Use**

This table shows in Panel A and B the OLS regression results with respect to the CDS use decision of the top 30 German and U.S. funds, respectively. Refer to Table 1 and 2 for the U.S. and German sample selection process, respectively. The dependent variables are the risk and performance measures as defined in Table 8 and section 4.2. Crisis equals 1 for the crisis period (2007M07–2009M03) and 0 otherwise. CDS equals 1 if fund i used CDS in halfyear t and 0 otherwise. The control variables include fund size (TNA), total expense ratio (TER), fund age and fund flows (not reported). All regressions contain fund fixed effects (FE). *, **, and *** indicate significance at the 10 %, 5 %, and 1 % level, respectively. Standard errors are clustered at the fund level and are reported in parentheses.

Country	Variable	RETURN	EXCESS RET.	STD	BETA	IDIO	1ALPHA	3ALPHA	4ALPHA
Panel A	crisis	–0.0040	–0.0446	0.0017**	–0.0942**	0.0024***	–0.0024	–0.0003	0.0002
Germany		(0.0329)	(0.0312)	(0.0007)	(0.0406)	(0.0007)	(0.0015)	(0.0016)	(0.0012)
	CDS use	0.0644**	0.0580*	–0.0005	0.0485	–0.0012	0.0026**	0.0027*	0.0020
		(0.0311)	(0.0329)	(0.0007)	(0.0597)	(0.0008)	(0.0011)	(0.0014)	(0.0012)
	CDS * crisis	–0.0925*	–0.0840*	0.0010	–0.0923	0.0016	–0.0040*	–0.0050**	–0.0055***
		(0.0456)	(0.0434)	(0.0010)	(0.0855)	(0.0012)	(0.0022)	(0.0022)	(0.0017)
	Control var.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Adj. R square	0.2000	0.3132	0.6037	0.1630	0.5524	0.3473	0.3041	0.3712
	N	109	109	109	109	109	109	109	109
Panel B	crisis	–0.0817***	–0.0805***	0.0046***	–0.0666	0.0048***	–0.0032**	–0.0015	0.0108***
USA		(0.0263)	(0.0250)	(0.0014)	(0.0772)	(0.0014)	(0.0013)	(0.0015)	(0.0020)
	CDS use	0.0841	0.0704	–0.0011	0.0837	–0.0008	0.0027	0.0036	0.0069*
		(0.0629)	(0.0678)	(0.0019)	(0.1140)	(0.0018)	(0.0036)	(0.0040)	(0.0041)
	CDS * crisis	–0.0039	–0.0052	–0.0020	0.0883	–0.0023	–0.0011	–0.0017	–0.0102*
		(0.0488)	(0.0474)	(0.0022)	(0.1072)	(0.0022)	(0.0023)	(0.0027)	(0.0060)
	Control var.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Adj. R square	0.6467	0.6317	0.2235	0.0227	0.2218	0.6001	0.5039	0.1423
	N	116	116	116	116	116	116	116	116

Table 11: **Determinants of Fund Risk and Return: Net Short CDS Use**

This table shows in Panel A and B the OLS regression results with respect to the net short CDS use of the top 30 German and U.S. funds, respectively. Refer to Table 1 and 2 for the U.S. and German sample selection process, respectively. The dependent variables are the risk-performance measures as defined in Table 8 and section 4.2. Crisis equals 1 for the crisis period (2007M07–2009M03) and 0 otherwise. For funds which used CDS in a particular period, CDS net short equals 1 if fund i stayed net short in CDS in half-year t and 0 otherwise. The control variables include fund size (TNA), total expense ratio (TER), fund age and fund flows (not reported). All regressions contain fund fixed effects (FE). *, **, and *** indicate significance at the 10 %, 5 %, and 1 % level, respectively. Standard errors are clustered at the fund level and are reported in parentheses.

Country	Variable	RETURN	EXCESS RET.	STD	BETA	IDIO	1ALPHA	3ALPHA	4ALPHA
Panel A	crisis	0.0707	0.0342	0.0020*	0.1453	0.0022	0.0016	0.0017	–0.0011
Germany		(0.0742)	(0.0752)	(0.0010)	(0.1844)	(0.0018)	(0.0031)	(0.0029)	(0.0026)
	net short CDS	–0.0812	–0.0827	–0.0018*	–0.1049	–0.0011	–0.0023	–0.0025	–0.0021
		(0.0679)	(0.0716)	(0.0009)	(0.0713)	(0.0013)	(0.0022)	(0.0030)	(0.0020)
	net short CDS								
	* crisis	–0.1907*	–0.1846*	0.0022*	–0.3488	0.0035*	–0.0094*	–0.0084**	–0.0049
		(0.1059)	(0.1035)	(0.0011)	(0.2182)	(0.0018)	(0.0047)	(0.0039)	(0.0034)
	Control var.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Adj. R square	0.5023	0.6236	0.6451	0.4065	0.6203	0.5570	0.5711	0.6957
	N	40	40	40	40	40	40	40	40
Panel B	crisis	–0.1272	–0.1541	0.0005	0.3878	–0.0003	–0.0085***	–0.0083**	0.0035
USA		(0.0987)	(0.1097)	(0.0017)	(0.2666)	(0.0018)	(0.0026)	(0.0031)	(0.0063)
	net short CDS	0.1405	0.1231	–0.0062*	0.0774	–0.0060	0.0059	0.0032	–0.0043
		(0.1139)	(0.1164)	(0.0034)	(0.1121)	(0.0036)	(0.0058)	(0.0060)	(0.0072)
	net short CDS								
	* crisis	0.0381	0.0727	0.0030	–0.3590	0.0040*	0.0042	0.0047	–0.0040
		(0.1274)	(0.1369)	(0.0022)	(0.3127)	(0.0023)	(0.0044)	(0.0046)	(0.0103)
	Control var.	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Fund FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Adj. R square	0.7281	0.7196	0.2151	0.1532	0.1974	0.7088	0.6014	0.0721
	N	64	64	64	64	64	64	64	64

Table 12

Summary Statistics for Aggregate CDS and Missed Trades of German Funds from Period-end and Within-period CDS Data

This table reports summary statistics for the differences in CDS notional implied by period-end data, aggregate purchases and sales of CDS, and missed trades implied by period-end and within-period CDS data of German bond funds. The variable period-end difference in CDS notional (in mio. $) shows the difference in CDS holdings between present and past reporting dates. The aggregate sales CDS notional (in mio. $) reflects the aggregate within-period CDS sales reported by funds, while the aggregate purchases CDS notional (in mio. $) presents the aggregate purchases of CDS determined as the sum of the respective period-end difference in CDS notional and aggregate sales CDS notional. The missing trades (as a fraction of aggregate CDS) show the fraction of the higher of aggregate sales or purchases of CDS not explained by the period-end difference in CDS notional.

Germany

Variable	*N*	*mean*	*sd*	*min*	*p25*	*p50*	*p75*	*max*
Period-end difference in CDS notional (in mio. $)	56	23.5408	183.5515	–577.5111	–20.1476	7.7089	91.4164	818.1523
Aggregate purchases CDS notional (in mio. $)	56	705.1489	1,593.5419	0.5392	43.4869	162.6237	519.4897	8,151.6802
Aggregate CDS sales notional (in mio. $)	56	681.6081	1,585.1466	3.9510	26.5422	115.6641	501.2390	8,186.6416
Missed trades (as a frac. of agg. CDS notional)	56	0.6266	0.3292	0.0205	0.2745	0.6728	0.9556	1.0000

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