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Manager Characteristics and Credit Derivative Use by U.S. Corporate Bond Funds

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Abstract

This study provides a comprehensive overview of the use of credit default swaps by U.S. corporate bond funds and analyzes in detail whether certain characteristics of managers, in addition to the fundamentals of a fund, determine how their use these credit derivatives. Results suggest that a manager's education, age, experience, and skill are positively correlated with a fund's CDS holdings. In particular, managers holding a master's degree or educated at prestigious universities prefer using CDS. However, funds with older, more experienced managers or these keeping higher assets under their management are more likely to take on credit risk via selling CDS protection. Younger managers or managers that were educated at prestigious universities rather tend to buy CDS protection possibly due to differing concerns about their careers. If considering the Heckman correction for self-selection of funds into CDS use, the aforementioned findings remain stable.

JEL Classification: G23, G28

Key Words: Manager, manager characteristic, mutual fund, derivative use, credit default swap

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1 Introduction

Credit derivative use heavily increased after the turn of the century and led to severe losses among financial institutions and mutual funds during the financial crisis 2007-2009 (Stulz (2010), Adam and Guettler (2014)).[1] However, it is still an open question which types of credit default swaps (CDS) are preferably used by funds and what determines the use of derivatives, such as CDS. Which funds choose reducing versus taking on additional credit risk exposure via CDS, and to what extent?

Existing literature links fund characteristics (e.g., Koski and Pontiff (1999), Johnson and Yu (2004) and Marin and Rangel (2006)) and regulation (Gałkiewicz (2014)) to a fund's derivative use. However, recent literature suggests that specific characteristics of a fund manager determine risk taking as well (e.g. Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Kempf, Ruenzi and Thiele (2009), Cici and Palacious (2013), and Adam and Guettler (2014)). So far, little is known about the link between manager characteristics and the decision to use derivatives. This study analyzes the types of CDS used by corporate bond funds and the determinants of a fund's decision to use CDS. In particular, beyond single versus team structure of the management the potential impact of manager characteristics is analyzed, such as the assets under management, age, tenure, gender, type and quality of education of a manager (or team).

For the purposes of this study, the 100 largest U.S. corporate bond funds included in the CRSP database (as determined by the size of their net assets in mid-2004) are investigated. They capture 75% of the respective market (Adam and Guettler (2014)). Extensive CDS data including their quarterly notional amounts, market values, and buy or sell direction are collected by hand from the funds' annual, semiannual, and quarterly U.S. filings, which are obtained from the SEC or via the EDGARpro database. Fund-level data stem from CRSP, while management team characteristics are obtained from Morningstar and supplemented by information from CRSP, Bloomberg, and fund websites.

Overall, funds often use multi-name CDS written on CDS indices and bond indices, which are not asset-backed securities (ABS), while the majority of single-name CDS reference issuers stem from the industries of financials, others, and sovereign governments categories. During the height of the crisis in 2008, a significant increase in short CDS written on multi-name underlying positions and long single-name CDS is observable. The results indicate that the probability to use CDS is associated with

[1] For example, Mahieu and Xu (2007) and Minton, Stulz, and Williamson (2009) presume that only a small fraction of loans are hedged by banks via CDS. Furthermore, Van Ofwegen, Verschoor, and Zwinkels (2012) find a positive relationship between credit derivative use and the insolvency risk of the 20 biggest European financial institutions.

the type and quality of a manger's education. Managers with a master's (as compared to bachelor's) degree and managers that hold a degree from a top 20 university are more likely to use CDS. This suggests that better educated and networked managers have a higher level of sophistication necessary to use derivatives (e.g., Cici and Palacious (2013)), and do not shy away from using CDS. By contrast, team-managed funds are less likely to use CDS.

Besides analyzing the choice to use CDS, I analyze the decision to taking on additional credit risk exposure via CDS (net short CDS) as opposed to reducing it (net long CDS). This is particularly interesting as net short CDS strategies had a high potential for loss during the crisis (Adam and Guettler (2014)).[2] The size and direction of the CDS net notional (long – short positions) allows an estimation of whether CDS were largely used for hedging (if positive, net long in CDS) or gaining exposure (if negative, net short in CDS). Managers having higher assets under management, i.e., those who were successful in the past (e.g., Berk and Green (2004), Wu, Wermers, and Zechner (2013)), are more likely to stay net short in CDS when using CDS. A similar result can be observed for managers who are older and more experienced. On the contrary, younger managers and managers who obtained their degree at a prestigious university are more likely to stay net long in CDS when using this instrument. The finding that highly reputed managers pursue more risky investment strategies is consistent with the prevalence of different sensitivities to the performance-termination relationship (Chevalier and Ellison (1999a)). Hence, managers with a lower reputation tend to shy away from risky investment strategies, potentially out of fear of losing their job.[3]

This study adds to earlier studies on derivative use (e.g., Koski and Pontiff (1999), Johnson and Yu (2004), and Marin and Rangel (2006)) by showing that, in addition to narrow fund characteristics, the management structure of a fund, number of women in management, the type and quality of a manger's education as well as experience and professional skill play a significant role in the extent and type of CDS use by a fund.[4] To the best of my knowledge, this is the first study that controls for professional skill via the assets under the management of a manager (or team) across several funds in an open-end mutual fund setting and shows its importance for a fund's decision to stay net short in CDS.

[2] For example, U.S. corporate bond funds pursuing net short CDS strategies during the crisis had alphas, which were 51-80 basis points lower per month than those of funds that were net long (Adam and Guettler (2014)).

[3] If convexity of fund flows is given and a manager's salary (and job termination) depends on its fund's TNA, managers might engage in fund tournaments and fund family tournaments to attract higher investor inflows and support from a fund family (e.g. Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Kempf and Ruenzi (2008), and Kempf, Ruenzi, and Thiele (2009)). However, high tenure managers care less about performance-based compensation than younger managers (Chevalier and Ellison (1997), and Kempf, Ruenzi and Thiele (2009)).

[4] Current derivatives studies show that, among others, the occurrence of female fund managers makes using options (Cici and Palacious (2013)) or CDS (Adam and Guettler (2014)) by a fund less likely. This is also the case with regard to option use if funds have high tenure managers or managers with high GMAT scores in place (Cici and Palacious (2013)).

The results are relevant for the public and regulators as the characteristics and incentives of managers determine the investment behavior of funds.

The rest of the paper proceeds as follows. Section 2 presents the related literature. In section 3, the CDS-related strategies are discussed and hypotheses are developed. The data are presented in section 4. Section 5 analyzes fund CDS use in detail and the determinants of a fund's decision to use, and extend the use of CDS. Section 6 concludes.

2 Literature Review

Early studies on derivative use (e.g., Koski and Pontiff (1999), Johnson and Yu (2004) and Marin and Rangel (2006)) suggest that the decision to use derivatives is affected by fund characteristics, such as membership in a fund family, size, age, expense ratio, turnover ratio, and investment style.[5] Further, when analyzing the use of derivatives by funds, Koski and Pontiff (1999) proposed the cash flow management hypothesis as an alternative explanation to the tournament hypothesis. New cash investments or redemption requests to the funds automatically change the risk position of funds, with increasing cash positions decreasing risk and increasing borrowing increasing risk. Derivatives might help funds smooth this effect and reach a target risk level faster. Although the results of earlier studies on the impact derivative use has on the risk and return profile of funds are ambiguous, derivatives can be used to increase the volatility of returns in accordance with the tournament hypothesis. Thus, if convexity of fund flows is given and a manager's salary (and potential termination from the job) depends on their fund's TNA, managers might engage in fund tournaments and fund family tournaments to attract higher investor inflows and support from a fund family (e.g., Brown, Harlow, and Starks (1996), Chevalier and Ellison (1997), Kempf and Ruenzi (2008), and Kempf, Ruenzi, and Thiele (2009)).[6] In consequence, derivatives might be used as means by which managers influence the riskiness of their funds to increase returns after past short-term relative under- or outperformance. Along the same lines, Almazan, Brown, Carlson, and Chapman (2004) show that, consistent with an optimal contracting equilibrium, in the fund industry internal restrictions are most common at funds managed by boards with fewer outside directors, if the portfolio manager is more experienced, if the fund is managed by a team, and if the fund does not belong to a large complex.

[5] In a recent study, Cici and Palacious (2013) show that option use by funds is positively related to their size and expense ratios, and negatively related to having a high tenure manager in place and the occurrence of women in management. For a subset of managers, they also show that managers with high GMAT scores are less likely to use options.

[6] Additionally, Taylor (2003) confirms the former findings of Chevalier and Ellison (1997) that managers of well-performing funds have an incentive to increase the riskiness of their funds in the second half of the year in order to stay ahead of poorly-performing funds in a game theoretical framework.

Furthermore, Deli and Varma (2002) find that funds decide to permit investments in only derivatives that offer the highest transaction-cost benefits.

Another related stream of literature focuses on the performance of managers (or teams of managers) of open- or closed-end funds based on variables controlling for the quality of managers, e.g., Chevalier and Ellison (1999a), Chevalier and Ellison (1999b), Atkinson, Boyce Baird, and Frye (2003), Baer, Niessen and Ruenzi (2009), Baer, Kempf and Ruenzi (2011), and Wu, Wermers and Zechner (2013). When analyzing single and team managers of U.S. equity funds between 1996 und 2003, Baer, Kempf and Ruenzi (2011) find that teams make less extreme investment decisions and follow more stable investment styles over time than single managers (however, on average, team-managed funds slightly underperform single-managed funds). According to the authors, this implies that teams average out the extreme opinions about a fund's investments of their members in the sense of the diversification of opinions theory (Baer, Kempf and Ruenzi (2011)). Their findings stand in opposition to former results of experimental studies conducted on group decision-making (e.g., see Stoner (1961), Wallach, Kogan and Bem (1961), Wallach and Kogan (1965), Stoner (1968), Pruitt and Teger (1969), and Brown (2000) for an overview), which show that teams take more extreme and inferior decisions than individuals. Almazan, Brown, Carlson, and Chapman (2004) show that teams often face internal fund restrictions on investments, which they relate to the lower stakes in terms of reputation teams have in comparison to their single-manager counterparts and therefore the incentive to limit their effort (Holmström (1982)).[7] Patel and Sarkissian (2014) also find that teams do not take excessive risks and trade less aggressively than single managers (leading to additional fund inflows and higher risk-adjusted returns). They attribute these findings to the higher benefits (and lower costs) of information generation by interaction within teams, following the studies of Sharpe (1981), Barry and Starks (1984), and Sah and Stiglitz (1986, 1991). Sah and Stiglitz (1986, 1991) stress that teams responsible for portfolio management are able to reduce portfolio risk and induce better performance through the diversification of style and judgment of their members. The results of the study of Patel and Sarkissian (2014) further suggest that the lack of observable outperformance of teams in the studies of, e.g., Chen, Hong, Huang, and Kubik, (2004), Massa, Reuter, and Zitzewitz (2010), and Baer, Kempf and Ruenzi (2011) might be driven by inconsistencies in the records of management structure in the CRSP database as compared to SEC filings or the Morningstar database.

Apart from team structure, literature provides insight into an extensive set of variables, used to approximate the quality of managers, that have an impact on the investment policies of funds, and

[7] Free-riding within teams (Holmström (1982)) is often referred to in economics by, e.g. Alchian and Demsetz (1972), Rasmusen (1987), and Nalbantian and Schotter (1997).

hence, their performance. For example, the educational background of fund managers (bachelor's or master's degree, PhD (or equivalent)), and whether or not they obtained their degree from a prestigious university are expected to be important for the quality of education and professional network (e.g., Chevalier and Ellison (1999b)). Furthermore, young managers are more risk-averse than older managers due to the higher risk of termination, but at the same time, they might also be willing to put in more effort than their older counterparts (Chevalier and Ellison (1999a)). From Chevalier and Ellison (1999a) it is known that longer tenured managers are less responsive to performance-based compensation because of their higher reputation. On the other hand, during recessions when new job opportunities are rare, longer tenured managers fear to lose their jobs just as much as their younger counterparts (Kempf, Ruenzi and Thiele (2009)). In line with this argument, Wu, Wermers, and Zechner (2013) find that investors do not respond to the underperformance of longer tenured managers even in the context of closed-end funds, which, according to law, may not be distributed publicly (SEC Staff Report (2003)). Kempf, Manconi and Spalt (2013) find that performance is higher when managers have more experience in the industries in which the fund is investing compared to less experienced managers; Adam and Guettler (2014) reveal that funds with more experience using CDS perform better during the 2007-2009 financial crisis than funds with less experience. Furthermore, following the Berk and Green (2004) model, Wu, Wermers, and Zechner (2013) find that managers who generate high shareholder surplus (using fund premium as a proxy in the case of closed-end funds) capture rents on their professional skills by expanding the amount of assets under the control of management across several funds and increasing management fees, which are part of the expense ratio.

In addition, women are generally perceived as being risk-averse and less competent in financial decision making than men (e.g., Niessen-Ruenzi und Ruenzi (2013)). However, Atkinson, Boyce Baird, and Frye (2003)[8] find no significant differences in terms of performance, risk, and other fund characteristics when comparing fixed-income funds managed by women and men. In their comprehensive overview study, Croson and Gneezy (2009) state that "the evidence suggests that managers and professional business persons present an important exception to the rule that women are more risk-averse than men."[9] Odean (1998) and Barber and Odean (2001) instead view gender as a proxy for overconfidence, with men being more overconfident than women, especially in tasks such as financial decision making. They show that men are trading too much in stocks and have lower

[8] However, they find evidence of gender influencing the decision making of mutual fund investors who invest less into funds managed by women compared to ones managed by men, especially for the manager's initial year managing the fund. This result is confirmed by a more recent study on customer-based prejudice due to gender-based stereotypes by Niessen-Ruenzi und Ruenzi (2013), who suspect these stereotypes to negatively affect a fund family's decision to hire women.

[9] Croson and Gneezy (2009), p. 454.

returns. Niederle and Vesterlund (2007) argue that, in comparison with men, women shy away from competition, which can be explained by men being more overconfident and gender differences in preferences for competing, while risk and feedback aversion only play a minor role.

The impact of team composition on fund performance becomes visible in more recent studies. Baer, Niessen, and Ruenzi (2009) find that work-group diversity related to tenure and education, which represents informational diversity, has a positive impact on the performance of management teams. By contrast, these authors find that work-group diversity in terms of gender and age, which reflects social-category diversity, has a negative impact on the performance of management teams. In another study, Patel and Sarkissian (2014) observe benefits if management teams are situated in financial centers and consist of more homogeneous team of managers in terms of education and age, possibly reflecting less friction caused by an alignment of career perspectives. Further research in needed on these topics to understand the drivers of the ambiguous, and sometimes conflicting, results provided by the aforementioned studies.

3 CDS Strategies and Hypotheses Development

3.1 CDS Strategies

Regarding bought CDS (protection buyer, long position), one can at least distinguish between three strategies: First, buying CDS protection on a specific underlying bond without having the underlying bond in the portfolio (naked long CDS) is a bet on the deterioration of the creditworthiness of a company. This strategy has a speculative nature and exposes the fund to additional counterparty risk.[10] Second, having the underlying in the portfolio and buying CDS protection on it is likely a way to hedge against a value loss of the bond caused by its deteriorating credit quality.[11] Third, simultaneously buying a bond and CDS protection on this particular 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 in both markets. Buying CDS at a lower spread than implied by the bond spread (CDS basis = CDS spread - bond spread) without further assuming the default of the counterparty would be a so-called “negative basis trade”, or a way to realize arbitrage gains (e.g., Oehmke and Zawadowski (2013)).

[10] However, it might be that by entering into long CDS on financial institutions, a fund hedges part of its counterparty exposure. By contrast, a high volatility in long CDS positions could also be an indicator of speculative strategies.

[11] 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 this bond.

In the case of sold CDS (protection seller, short position), at least two additional strategies should be mentioned: First, selling CDS protection and investing the notional amount into Treasuries would allow a fund to synthesize a bond/index, e.g., to diversify the portfolio. Additionally, this investment strategy could be the only way, or at least a cheaper way, to acquire a specific bond, depending on market conditions (e.g., Stulz (2010)).[12] Second, selling CDS protection without simultaneously increasing Treasuries is similar to buying a bond and borrowing the notional principal of the bond from a bank. In doing so, a levered bond position is created, which is significantly riskier than a regular, unlevered bond position. If the CDS underlying positions are different from the other holdings, gaining additional exposure could help diversify the portfolio. Nevertheless, this strategy has a speculative nature. In addition, one can exploit the interest rate changes over time by buying CDS at low levels and selling them at high levels of credit risk premia (credit market timing).[13] In the case of bond funds, one could have bought CDS before the financial crisis of 2007 to 2009 and sold them during the crisis to realize a gain. Alternatively, funds can buy or sell CDS to offset previously sold or bought CDS positions on exactly the same securities (with similar notional amount, coupon, and maturity) to close existing positions.

Focusing on the aggregate single-name or multi-name long and short CDS positions of funds does not allow one to distinguish the purposes of CDS use (e.g., hedging or negative-basis trading). However, the size and direction of the CDS net notional allows an estimation of whether CDS were largely used for hedging (+) or gaining exposure (-), as suggested by Adam and Guettler (2014). Furthermore, based on the matching of CDS references, I can distinguish the part of the CDS used to close existing positions from the other that reflects ongoing strategies at reporting date.

3.2 Hypotheses

In this study, I want to test several hypotheses motivated by previous research on the investment strategies of funds and apply them to the decision to use credit derivatives, such as CDS.

3.2.1 The Determinants of the Decision to Use CDS

The focus of this study lies on an extensive set of variables, used to control for the quality of managers (their ability, effort, and knowledge), which have an impact on the investment policies and

[12] It could also be a way to bypass issuer-oriented rules in the U.S., for example, the diversification rule, that restrict a fund's investments into securities of one issuer to 5% of a fund's TNA. Bonds and CDS are usually accounted for at market values under this rule, with CDS typically having a much smaller fair value, while having the same characteristics when used in combination with Treasury securities to synthesize bonds. See Gałkiewicz (2014).
[13] See Adam und Guettler (2014).

performance of funds. For example, Chevalier and Ellison (1999b) argue that the quality of the educational background of fund managers, as measured by university prestige, is important for the quality of their education and professional network. Since using derivatives requires some level of sophistication (e.g., Cici and Palacious (2013)), better educated managers could be more inclined to use derivatives. From this follows hypothesis I:

Hypothesis I: Managers that were educated at more prestigious universities are more likely to use CDS.

Whenever more sophisticated, well-trained fund managers are able to earn economic rents on their skills and training through fees, the expense ratio might be related to derivative use, e.g., CDS. In addition, as suggested by Wu, Wermers, and Zechner (2013) who follow the Berk and Green (2004) model, managers that generate high shareholder surplus, using fund premium as a proxy in the case of closed-end funds, capture rents on their skills by expanding the amount of assets under the control of management across several funds and increasing management fees, which are part of the expense ratio. The assets under the management of managers (which are affected by the inclusion and exclusion of funds, fund flows, and returns) measure the output of their skill and experience over time. If better-skilled managers use derivatives, I expect those extracting rents via increases in the assets under management (AUM) across several funds to use CDS.[14] This also accounts for a fund family's policy to choose specific managers to manage one or all funds belonging to a fund family. From this reasoning follows hypothesis II:

Hypothesis II: Managers with higher assets under management are more likely to use CDS.

3.2.2 The Determinants of the Decision to Use CDS for Risk-increasing Purposes

From Chevalier and Ellison (1999a) it is known that young managers are more risk-averse than older managers due to higher termination risk (Chevalier and Ellison (1999a)) and therefore might be less willing to use derivatives, such as CDS, for risk-increasing purposes. However, young managers might also be willing to put more effort into the management of the fund (Holmström (1982), and Chevalier and Ellison (1999a)) and try to use their knowledge on derivatives to manage their funds more successfully than their peers (since the use of derivatives has increased over the last 20 years, education has focused more on this type of financial instrument). Furthermore, longer tenured managers are less responsive to performance-based compensation because of their high reputation.

[14] The expense ratio is not considered as it might lead to ambiguous results because it decreases over time as competition increases and because funds that have higher fractions of institutional holdings charge lower fees (ICI Fact Book (2013)).

In addition, Wu, Wermers, and Zechner (2013) find that investors do not respond to the underperformance of longer tenured managers even in the context of closed-end funds. On the other hand, during recessions when job opportunities are rare, longer tenured managers fear the loss of their jobs just as much as their younger counterparts (Kempf, Ruenzi and Thiele (2009)). From these insights into the sensitivity of managers with regard to performance-based termination, follows hypothesis III:

Hypothesis III: Younger managers are less likely to use CDS for risk-increasing purposes (i.e., staying net short in CDS) and more likely to use CDS for risk-decreasing purposes.

The presence of women in management might also influence a fund's decision to use CDS. According to Niessen-Ruenzi und Ruenzi (2013), women are generally perceived as being risk-averse and less competent in financial decision making. However, following the findings of Atkinson, Boyce Baird, and Frye (2003) and Croson and Gneezy (2009), women should not be perceived to be more risk-averse than men if both have equally high skill and knowledge in a professional setting.[15] If women are actually more risk-averse then men in the financial setting, women in single and team management roles could be expected to decrease the overall risk of a fund. Thus, hypothesis IV is based on the common perception of women being risk-averse:

Hypothesis IV: Female managers are less likely to use CDS for risk-increasing purposes (i.e., staying net short in CDS) and more likely to use CDS for risk-decreasing purposes.

The experimental literature on group decision making (e.g., Stoner (1961), Wallach, Kogan and Bem (1961), Wallach and Kogan (1965), Stoner (1968), and Pruitt and Teger (1969)) shows that teams raise more extreme opinions and consequently make more extreme decisions than individuals. Brown (2000) provides an overview of several possible socio-psychological explanations for this phenomenon. For example, according to social comparison theory, teams tend to shift their opinion towards an extreme opinion of a dominant team member as this kind of adjustment allows individuals to believe that they are more similar to the person they perceive to be their superior. However, in a professional setting, Baer, Kempf and Ruenzi (2011) find empirical evidence that teams make less extreme investment decisions and follow more stable investment strategies over time. The authors interpret the results as an indication that team members average out extreme opinions in the sense of the diversification of opinions theory. On the other hand, Almazan, Brown, Carlson, and

[15] According to Barber and Odean (2001), men are more likely to be overconfident in a financial environment, which could be observable in a higher extent of trading as compared to their women counterparts. However, further research is needed to disentangle the effects of gender-based differences in risk-aversion versus overconfidence in a finance environment.

Chapman (2004) show that between 1994 and 2000, teams managing U.S. equity funds face more restrictions on investments in equity options, index futures contracts, restricted stocks, on borrowing money, trading on margin, and short selling than single managers. They contribute this result to the fact that individual team members usually have less reputation at stake than single managers and therefore might decrease the amount of effort put into managing a fund (Holmström (1982)). In this context, one could imagine that teams might choose more extreme investment positions, e.g., invest in net short positions in CDS, not only because of reasons based on group shift theory, but also because of their (non-assignable) reputation. From these findings, hypothesis V follows:

Hypothesis V: Teams are more likely to use CDS for risk-increasing purposes (i.e., staying net short in CDS) and less likely to use CDS for risk-decreasing purposes than single manager.

4 Data

In order to investigate the decision of funds to use CDS (including various types of CDS), I collect the data about CDS holdings contained in the quarterly reports of the 100 largest U.S. corporate bond funds during the period 01.07.2004 to 31.12.2010 (see Adam and Guettler (2014) for a detailed explanation of the procedure). Since 2004, U.S. mutual funds are required to disclose the names of managers and report their portfolio holdings on a quarterly basis. The focus of this study is on U.S. funds that 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. Money market funds, treasury funds, municipal funds, mortgage funds, and fund reports created after a merger are excluded from the sample. The focus of the study is on the 100 largest U.S. corporate bond funds (as determined by the 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) since participation in the CDS market requires some critical size (Adam and Guettler (2014)). The largest fund in mid-2004 is the Total Return Fund of the PIMCO fund family with a TNA of $73 billion, while the smallest fund is the Federated Strategic Income Fund, belonging to the Federated Fixed Income Securities, with a TNA of $1 billion.

The U.S. annual, semi-annual and quarterly reports are obtained from the SEC webpage or via the EDGARpro database. In the first step, I search for details regarding CDS positions (i.e., CDS notional amounts of bought and sold positions, market values of CDS, reference assets including coupon and maturity, if reported) in the schedule of portfolio holdings. As a result, I end up with 45,101 CDS positions held by 69 funds at some point between mid-2004 and the end of 2010. The final sample

consists of 2,557 fund-quarter observations; however, the lack of availability of various manager characteristics reduces my sample to 2,235 and 1,957 fund-quarter observations, respectively.

The extent of total CDS use at reporting date is determined by summing up the notional amounts and relating them to a fund's TNA at the fund-quarter level (**Table 1**). However, for investigating the determinants of the decision to use CDS, I use a dummy variable that indicates whether or not a fund used CDS in a particular quarter between 2004 and 2010 ("CDS Dummy"). According to Adam and Guettler (2014), U.S. funds pursuing net short CDS strategies during the crisis had alphas that were 51-80 basis points lower per month than these of funds that were net long. Therefore, in a second step, I use a dummy variable that indicates whether or not a fund was net short in CDS ("CDS net short") and therefore created exposure to credit risk. In subsequent analyses of the determinants of CDS use, these dummy variables are replaced by the CDS notional ("CDS/TNA") and CDS net notional amount ("CDS net/TNA") as related to a fund's net assets. The CDS notional amount reflects the par amount of credit protection that is bought or sold by a fund. The net notional position is determined based on aggregated long minus short CDS positions and reflects a fund's indirect leverage.

In addition, in order to analyze the extent that funds use various types of CDS, I split up the overall CDS position into various types of CDS like long or short single-name CDS, and multi-name CDS. Since the CDS net notional includes, but is not limited to, offsetting positions, I separate offsetting positions from the other reported CDS positions. All positions identified as offsetting tools do not represent ongoing strategies, i.e., funds may have used these at an earlier date for unknown reasons (e.g., credit market timing, speculation, synthesizing securities, hedging). Usually long and short CDS positions cancel each other out if both are written on exactly the same securities (with the same notional amount, coupon, and maturity). However, some of the funds do not report the details of the underlying bonds of CDS, such as coupon and maturity. Therefore, to determine the fraction of offsetting positions within long (and short) CDS in a more precise manner than by subtracting aggregated short CDS from long CDS, I match long and short CDS positions written on the securities of the same issuers (e.g., identify corporate names, bond, CDX or ABX indices). To distinguish them from the net notional positions derived from aggregated long minus short CDS, they are referred to as either offsetting or non-offsetting positions later in the text. **Table 1** provides descriptive statistics for all available CDS observations, which are discussed in detail in section 5.1.

Moreover, I obtain data on fund characteristics, such as inception date, expense ratio, turnover ratio, the fraction of institutional investors, fund class, fund flows, and returns[16], from CRSP. In addition,

[16] I thank Adam and Guettler (2014) for providing me with 1F- and 4F-alphas determined over 3 and 6 months.

based on the turnover ratios (CRSP) and average duration figures (Morningstar), I also derive an adjusted turnover ratio, i.e., the residual of the regression of turnover ratio and the average duration of funds, which is available for the period 2006 to 2010 (not reported). This adjusted turnover ratio accounts for the fact that some of the funds might be short-term oriented and have systematically higher turnover ratios than their long-term oriented counterparts. Additionally, to proxy for other unobservable factors that govern the use of derivatives, I create an additional variable ("other derivatives"). Data from question 70 of Form N-SAR allows me to identify whether or not a fund uses other derivatives, such as options or interest futures.[17]

I obtain data on manager characteristics from the Morningstar database, check it with the CRSP descriptions, and supplement it with information provided by Bloomberg, fund reports, and fund websites. Finally, I end up with information on 492 managers, comprising 138 management constellations. In particular, this includes 57 constellations of single managers (3 women and 54 men) and 81 constellations of teams (21 out of the 81 teams comprise one woman manager; 6 include two women managers). The assets under management variable ("AUM") is created using the names of managers in the sample and their belonging to specific teams. This variable is, by definition, highly correlated with fund size (especially for single managers); therefore, in addition to AUM, the relative importance of a particular fund's TNA in relation to the AUM – instead of fund size – is incorporated in the specifications that contain an extended set of variables. **Appendix A** contains a full list of variables used in the study together with descriptions of their construction process and **Table 2** summarizes the descriptive statistics, which are discussed in detail in section 5.2.

5 Results

After presenting an analysis of the extent that funds use various types of CDS, the characteristics of the sample funds are shown in detail. Next, the regression results are shown for the determinants of a fund's decision to use CDS, the use of net short strategies in CDS, and the extent of CDS use.

5.1 The Use of Various Types of CDS by Funds

The following analyses show which types of CDS are predominantly used by funds. **Figure 1** presents the increase in the number of CDS users from 22 in 2004 to 61 funds in 2008, back to 46 funds in

[17] For each a dummy variable that equals "Y", if the fund is permitted to write or invest in, e.g., options and a dummy that equals "Y" if the fund was engaged in this activity during the reporting period can be observed. See Form N-SAR, question 70, [http://www.sec.gov/about/forms/formn-sar.pdf, visited on 20.12.2013]. However, the sample funds face an almost similar level of restrictions (not reported).

2010. In **Table 1**, various CDS data are listed for all funds that use CDS (1,768 observations) and for the subgroups of funds choosing to stay net long or short in CDS in a particular period. According to **Table 1**, the mean percentage of CDS in relation to a fund's TNA, aggregated on a quarterly basis between mid-2004 and 2010, equals 4.76% (the median value is 0.90%) of a fund's TNA. Accounting for an average of 3.05% of TNA, short CDS positions of a fund at reporting date are approximately two times higher than long CDS positions (with an average value of 1.70% of TNA). The median values indicate that funds tend to keep a small position of short CDS and not hold any long CDS. For the funds that are net short in CDS 791 times, the average short CDS is almost twice as high as the general trend at 6.08% (median value of 2.32%) of TNA, while the average long CDS equals 1.28% (median value of 0%). By contrast, funds that choose to stay net long in CDS in 356 quarters have three times higher average long CDS – 5.60% (median value of 2.44%) of TNA – than suggested under the general trend, while short CDS reach an average level of 1.63% (median value of 1.32%).

Figures 2 to **4** show the development of the average and median CDS positions during a particular period conditional on CDS use. **Figure 2** shows that the long and short CDS positions of funds are much higher between mid-2007 and the end of 2008 than in the pre- or post-crisis periods. In particular, a significant increase in long CDS written on single-name references and in short CDS written on multi-name underlying positions is observable during the height of the crisis (**Figure 3**), while CDS written on multi-name references, on average, dominate CDS use across the period. Almost all funds keep more short than long CDS (went net short) until the end of 2008, when the credit risk premium (measured by the yield difference between BBB-rated debt and Treasury securities) rose significantly. Hence, funds that used short CDS as a speculative tool (not for synthesizing bonds in combination with Treasury securities) during the financial crisis potentially suffered substantial additional losses because of the large increase in credit risk premia at this time (see **Figure 2**). As opposed to findings from average CDS figures, median values indicate that long multi-name CDS are only kept by funds between the second half of 2006 and the second half 2009. Furthermore, median values indicate that short single-name CDS are used constantly over time, while their multi-name counterparts are used from time to time and reach a peak after the Lehman bankruptcy. This might be a sign that in a difficult environment where both trust and liquidity in the market dry up, the majority of funds focus on multi-name CDS as means by which they can hedge or increase exposure to the market for diversification purposes more easily than direct investments in bonds or indices. The descriptive analysis thus far indicates a wide heterogeneity in the CDS strategies of funds.

The fair value of CDS as related to a fund's TNA in **Table 1** reflects the unrealized gain/loss from CDS that lowered a fund's TNA at reporting date. It shows that, on average, funds suffer an unrealized loss of -0.19% of TNA (0% in median) from CDS. Interestingly, the highest observable unrealized loss equals 52.30% and is realized by a fund that chose to stay net long in CDS implying that it possibly pursued costly hedging, unsuccessful betting and/or credit market timing strategies. The highest unrealized gain of 15.07% can be identified for a fund staying net short in CDS where short CDS could have been used for credit market timing, creating leverage or synthesizing bonds/indices.[18] In general, as presented in **Table 1**, funds staying net long in CDS keep, on average, more long CDS written on single-name than on multi-name references (2.98% vs. 2.62% of TNA) together with some short CDS mainly written on multi-name references. On the other hand, funds staying net short mostly use short CDS written on multi-name references (3.38% of TNA vs. 2.69% invested in single names) together with some long CDS mainly written on multi-name references. Mortgage related ABS, which were the center of attention during the crisis, play, on average, only a secondary role as CDS references for mutual funds (as opposed to insurance companies or banks).

In **Table 1**, long and short CDS are further distinguished by those used to close existing short and long CDS positions on an issuer-level basis and those that are non-offsetting.[19] Comprising 0.29% of a fund's TNA (on average), offsetting long CDS are much smaller than their non-offsetting counterparts, which make up 1.41% of TNA. The non-offsetting long CDS possibly indicate within reporting period investment activity of funds, which might have previously used these CDS for any strategy specified in section 2. In the case of short CDS, the same two categories are distinguished. Short CDS used for offsetting existing long CDS comprise 0.29% of TNA (as in the case of offsetting long CDS) and are much smaller than short CDS used for non-offsetting purposes, which account for 2.75% of TNA.

Appendix B shows another classification of CDS references based on a particular industry as defined under the Fama-French twelve industry classification (Consumer Non-Durables, Consumer Durables, Manufacturing, Energy, Chemicals, Business Equipment, Telecommunication, Utilities, Stores, Health, Financials, Other)[20] plus the category "Sovereigns" for U.S. and foreign government bonds. The "Other" industry category captures bonds related to the businesses of Mines, Construction, Transport, Hotels, Bus Services, Entertainment, and everything else that is not classified above. As shown in **Appendix B**, the number of CDS contracts referencing Financials, Others, and Sovereigns are

[18] This is possible because a fund can, at most, use all of its net assets for derivative coverage and since only short CDS (and not long CDS) require coverage. Thus, a fund could keep short CDS with a notional amount up to 100% of TNA as long as it is able to meet redemption requests immediately. A fund could keep long CDS with a notional value higher than 100% of TNA because their fair values are only restricted by the obligation to meet redemption requests. See Gałkiewicz (2014).

[19] Details on the underlying issues of CDS are often not reported (i.e., the maturity and the coupon of a bond is missing).

[20] For more information please refer to Kenneth R. French's website "Detail for 12 Industry Portfolios", [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_12_ind_port.html, visited on 20.03.2014].

multiple times higher than for other industries. Furthermore, the size of net positions (long minus short CDS) varies significantly at the fund-quarter-issuer level. In terms of size, long single-name CDS positions most often reference companies from the following industries: Stores (0.178% of a fund's TNA per issuer), Manufacturing (0.130%), and Non-Durables (0.126%). Most of the issuers of short CDS references stem from the Durables (-0.347% of a fund's per issuer), Sovereigns (-0.276%), and Finance (-0.208%) categories. Altogether, the highest net positions at the issuer level are observable in the industry categories: Durables (-0.302%), Sovereigns (-0.222%), and Utilities (-0.165%).

Overall, large heterogeneity regarding the types and extent of CDS used is observable across funds.

5.2 Initial Analysis of Potential Determinants of CDS Use by Funds

Table 2 reports the descriptive statistics for all observations used in further analyses, in particular for funds that do not use CDS compared to funds that use CDS. Out of the 2,557 observations, 789 are observations of 31 funds not using CDS (CDS nonusers) and 1,768 show 69 funds using CDS at least once between mid-2004 and 2010 (CDS users). As suggested by the results of the t-tests and the Wilcoxon rank-sum tests for differences in means and distributions, most fund characteristics significantly (at the 1% confidence level) differ for CDS nonusers in comparison to CDS users. For example, the observable mean (median) size of the CDS nonusers is $7,247 mio. ($3,634 mio.), which is higher than of the mean size of CDS users at $5,214 mio. ($1,864 mio.). CDS users are, on average, older than CDS nonusers, with an average age of 22.42 compared to 20.65, and are more often members of a fund complex (80.88% of the time versus 60.46%). Interestingly, less CDS nonuser observations belong to funds that are investment grade than for CDS users (46.13% versus 67.87%, respectively); thus, most high-yield funds do not use CDS. The observable fraction of institutional investments is smaller for CDS nonusers (with average values of 19.62% and median values of 5.66% of TNA) when compared to the fraction observed for CDS users (39.52% and 19.67%), suggesting that the investment focus of a fund and its willingness to use CDS might be affected by professional investors. Unlike the aforementioned characteristics, the expense ratio is comparable for CDS nonusers and users with a mean (median) of 0.77% (0.78%) for the former and 0.78% (0.69%) for the latter. By contrast, the turnover ratio equals 93.17% (51%) for CDS nonusers, while it is 164.34% (106%) for CDS users, which indicates that CDS users generally have higher trading activity (the difference remains even if the short-term orientation of funds is accounted for via the adjusted turnover ratio).

CDS users keep derivatives other than CDS, on average, in 63.08% (100% in median) of the quarters, while CDS nonusers only rely on other derivatives 16.03% of the time, on average (and no time in median). Furthermore, CDS nonusers experience (on average and for median values) new inflows of funds, while CDS users suffer from outflows. No significant differences in average quarterly returns and standard deviations can be observed. This is in line with previous findings of Adam and Guettler (2014), who, in general, do not find any performance and risk differences between these two groups.

Regarding manager characteristics, there are some commonalities observable in the groups of CDS users and nonusers. CDS nonusers (CDS users) are managed by single-managers in 38.78% (35.80%) of the quarters; for the remaining quarters, teams, on average, consist of more than two (three) people without any women. In 75.41% (73.39%) of the quarters, the highest educational degree obtained by a manager of a CDS nonuser (CDS user) is a master's degree; in 18.53% (24.47%) of the quarters a bachelor's degree, and in 6.06% (2.14%) of the quarters a PhD title. Managers of CDS nonusers hold a degree from a top 20 university in the U.S. in 50.12% of the quarters, while this value is 51.11% for the managers of CDS users. The experience of the managers of CDS nonusers and CDS users is comparable, with a mean of 2.62 and 2.55 years and median of 2.5 and 2 years, respectively. However, significant differences are also observable. For example, managers of CDS users are older than their nonuser counterparts, with a mean (median) age of 44.6 (43) years compared to 42.6 (42) years. By contrast, the proportion of women in management is higher for CDS nonusers, with 10.83% compared to 4.49% for CDS users. Between mid-2004 and 2010, the mean size of the assets under management for CDS nonusers ($13,937 mio.) is smaller than for CDS users ($20,139 mio). However, the opposite is true when analyzing median values, with $5,379 mio. for CDS nonusers and $4,473 mio. for CDS users. The fraction of TNA to AUM indicates that managers of CDS users advise more funds compared to CDS nonusers (with a mean/median number of funds of 3/5 and 2/3).

Overall, the above comparisons suggest that differences between CDS users and nonusers are more pronounced on the fund level than for manager characteristics.

5.3 The Determinants of Fund CDS Use

5.3.1 The Determinants of the Decision to Use CDS and the Extent of CDS Use

Table 3 reports the marginal probabilities of pooled logit regressions for the decision to use CDS, evaluating all independent variables at their means (which are provided in **Table 2**) and dummy variables when switching from 0 to 1. As compared to columns (1)-(2), columns (3)-(4) also contain a

proxy for a fund's use of derivatives other than CDS. In columns (5)-(6) the turnover ratio variable is replaced by the adjusted turnover ratio, which controls for the possible short-term orientation of funds. Past performance and standard deviation are likely to be highly endogenous variables, which is why I have not included them as regressors.

By comparing the results reported for a fund's decision to use CDS in columns (1)-(2) with columns (3)-(4), one can see that after the inclusion of the variable "other derivatives", which serves as a proxy for other unobservable factors that govern the use of derivatives, "other derivatives" become significant and also the explanatory power of the model increases, as indicated by the pseudo R-squared. Based on this finding, which is related to the fact that credit derivatives are part of a broader group of derivatives, I consider this variable in all specifications that follow. In the specification containing the extended set of variables[21], in column (4) of **Table 3**, the probability of a fund to use CDS is positively related to the presence of a fund manager who obtained a degree from a top 20 U.S. university (by ca. 12%) or who has a master's degree (by ca. 14%). Regarding management teams, the respective dummy variables become 1 whenever the majority of the team members obtained a degree from a top20 university or hold a masters' degree in order to enhance the interpretation of results. This confirms hypothesis I and suggests that managers with a supposedly better education or/and network (e.g., Chevalier and Ellison (1999a)) have the necessary knowledge, and are willing, to use credit derivatives. A relationship between the professional skills of a manager as measured by assets under management and potential CDS use could not be detected; thus, hypothesis II cannot be confirmed. This means that better educated, but not necessarily more successful, managers are willing to use CDS. The reported results also show that the management structure of a fund (team vs. single manager) is relevant for the decision to use CDS. The probability to use CDS is by approximately 21% lower for funds that are managed by a team in comparison to those managed by a single manager, which is of high economic relevance. Once the turnover ratio is replaced by its adjusted version and the sub-period 2006 to 2010 is considered, the result for the education of managers at prestigious universities turns insignificant, while the existence of a manger with a PhD becomes significant, with those funds being ca. 20% more likely to use CDS. By contrast, managers who advise fewer funds, e.g. a single instead of multiple funds, become ca. 29% less likely to use CDS. This suggests that the factors affecting the decision to use CDS slightly differ over time.

In the specifications containing fund characteristics with and without an extended set of manager characteristics, the age of a fund, fraction of institutional investors, and the use of other derivatives in

[21] With regard to fund size, it should be noted that this figure only occurs in the first specification in columns (1), (3) and (5). In the extended set of variables it is excluded because two additional measures are added that are, by definition, highly correlated, i.e., assets under management (AUM) and the relative importance of a fund's TNA to AUM.

parallel are positively correlated with its decision to use CDS at some point in the time between mid-2004 and 2010. In particular, funds that are 10 years older than the mean age of about 20 years (as determined for the natural logarithm of fund age) are ca. 10% more likely to use CDS. It suggests that well established funds are more likely to use CDS, which stands in opposition to earlier studies (e.g., Johnson and Yu (2004), and Marin and Rangel (2006)), where a negative relation to derivative use was found for fund age.[22] Additionally, having a larger fraction of institutional investors than the average of 33% of a fund's TNA (by at least 10%) makes it more likely that a fund will use CDS (by about 3% in any specification). However, CDS users have on average 39% of their TNA in institutional hands, as opposed to 20% for nonusers. Nevertheless, it remains unclear whether or not institutional investors have the power to directly influence a fund's investment strategy. Alternatively, professional investors, who often face strict investment restrictions themselves, might seek more diversification by funds, e.g., they invest in mutual funds that use more or less risky investment strategies that lie within the allowed ranges (demand effect). The aforementioned findings remain stable even if the turnover ratio variable is replaced with its adjusted version and the period 2006 to 2010 is considered, as shown in column 6. Lastly, if a fund invests in other derivatives, its probability to use CDS increases by ca. 24%. As mentioned before, unobservable factors affecting a fund's use of derivatives other than CDS have a considerable impact on a funds decision to use CDS. When controlling for unobservable time invariant characteristics of funds and managers via a conditional fixed effects logit model no significant correlations between the determinants analyzed before and the decision to use CDS could be identified (not reported). This suggests that either fixed effects or a wide heterogeneity of reasons influence CDS use.

Previous literature (e.g., Koski and Pontiff (1999), Johnson and Yu (2004) and Marin and Rangel (2006)) suggests that the decision to use derivatives is affected by fund characteristics, such as membership in a fund family, size, age, expense ratio, turnover ratio, and investment style. The results show that a fund's decision to use CDS, however, is influenced, ceteris paribus, by fund characteristics, such as age, fraction of institutional investors, and its parallel investments into other derivatives. This difference might be explained by the fact that CDS markets developed significantly since 2004 and were not considered in previous studies. If the extended set of variables is considered, in addition to the other fund characteristics, ceteris paribus, the presence of a single manager instead of a team, a manager with a master's degree or who obtained a degree (bachelor's or master's) from

[22] One reason for this discrepancy might be that although mutual funds were already allowed to enter into derivatives for investment purposes before the year 2000, managers often faced many internal restrictions on derivatives use around this time (e.g., Almazan, Brown, Carlson, and Chapman (2004)). This and the fact that derivative markets heavily developed in the last decade, especially CDS markets, which were not considered in previous studies, might have determined investment strategies pursued by mutual funds.

a top 20 U.S. university, makes CDS use more likely. Thus, manager characteristics are highly relevant for a fund's investment behavior with regard to credit derivatives.

In **Table 4**, the "CDS Dummy" is replaced by the respective total CDS use (as related to fund's net assets) variable ("CDS/TNA"). Columns (1)-(4) [23] show the results of OLS regressions where columns (3)-(4) also include fixed effects controlling for unobservable time invariant characteristics of funds and managers. The analysis performed in column (2) is extended by applying the Heckman correction (Heckman (1976, 1979)) based on maximum likelihood estimation for non-random self-selection of funds into CDS use and reported in column (5). As presented in column (2) of **Table 4**, regarding manager characteristics, only the occurrence of a woman in management leads to a decrease of the relative figure of total CDS by 0.0301 (of a fund's TNA) indicating that women in management use CDS to a smaller extent than their male counterparts. Given the average size of CDS holdings of 0.0476 (of TNA) presented in **Table 1**, the impact of the variable is also economically important. Although the occurrence of women managers does not significantly decrease the probability to use CDS, it negatively affects the size of CDS holdings. Interestingly, neither of the manager characteristics identified beforehand as increasing the probability to use CDS influences the size of the CDS holdings. This is possibly due to the fact that funds highly differ in terms of the extent they use CDS holdings over time. This explanation would be in line with the comparison of the size of CDS positions for funds preferring to stay net short versus net long in CDS (as shown in **Table 1**) and the general pattern of CDS use (presented in **Figure 2**).

Furthermore, the extent of CDS use is significantly positively affected by a higher fraction of institutional holdings, higher fund outflows, and a fund's use of other derivatives. For example, a 0.1 higher fraction of institutional investors increases total CDS by ca. 0.0399 (of TNA), while using other derivatives in parallel increases the extent of CDS use by 0.0469 (of TNA). In addition, fund outflows, which are higher by 0.01 of TNA, lead to an increase in overall CDS of ca. 0.0007 (of TNA). Similarly, the results of the fixed effects regression reported in column (4) of **Table 4** also show that the amount of total CDS increases with an above period average increase in outflows. This effect does not show up in the logit analyses previously mentioned. Under the cash-flow management hypothesis, one would expect funds facing outflows (as, on average, observable for the sample of CDS users) to decrease risk via derivatives, e.g., by entering into long CDS.[24] Alternatively, funds facing outflows are usually under pressure to sell some of their securities and might therefore use derivatives for

[23] For brevity, it is not tabulated that using a Tobit model specification does not change the results qualitatively.
[24] On the contrary, the risk decreasing effect of inflows could be smoothed by using derivatives, such as short CDS.

investment purposes, e.g., short CDS for synthesizing bonds/indices.[25] Later analyses might help clarify this issue. Furthermore, in column (4), it is shown that an increase in both the fund age and the level of experience of management increases the size of CDS holdings, which indicates that more experienced funds/managers (e.g., in using credit derivatives) are more likely to use this instrument.

The analysis of the extent of CDS use in column (5) is extended by applying the Heckman correction for sample selection. This two-stage estimation procedure considers the determinants of a fund's decision to use CDS in the first stage and the extent of CDS use in the second stage. It is reasonable to assume that the decision to establish a derivatives trading desk is made by the fund family, while managers can influence to which extent and how the fund uses derivatives. For example, Almazan, Brown, Carlson, and Chapman (2004) show that a fund's non-fundamental policy can be altered at the discretion of a fund's board of directors and include more business-specific restrictions. Therefore, in the selection regression (first stage), I focus on narrow fund characteristics; the results are similar to those reported in column (3) of **Table 3**. In the second stage, I additionally include manager characteristics. As suggested by the likelihood ratio test presented as a Wald test[26] (reported at the bottom of **Table 4**), the Heckman method is preferable to estimating two independent equations (at 5% confidence level) and together with the inverse of the Mill's ratio from the selection equation controlling for self-selection is recommendable. Results from column (5) of **Table 4** support the above findings regarding the negative (positive) impact of the occurrence of women (more experienced managers) on the extent of CDS use. Thus, managers who tend to use CDS often do not necessarily keep the highest/lowest positions in CDS which is supportive for a wide heterogeneity in terms of size of CDS positions across the funds and time.

5.3.2 The Determinants of the Decision to Stay Net Short in CDS and the Extent of Net CDS Use

Table 5 reports the marginal probabilities of pooled logit regressions for the decision to take on more credit risk by selling more protection via CDS than buying it ("CDS net short") versus reducing it, provided CDS are used by a fund in a particular period. Again, columns (1)-(2) present the results including the turnover ratio variable, while columns (3)-(4) include the adjusted turnover ratio variable controlling for the possible short-term orientation of funds. The analysis performed in column (2) is extended by applying the Heckman correction (Heckman (1976, 1979)) based on

[25] Discussions with practitioners reveal that especially during the 2007-2009 financial crisis bond funds preferred to keep a large amount of cash holdings to be able to meet redemption requests and therefore decided to keep or build up exposure to individual names and indices via derivatives such as CDS. At this time, the levels of CDS use by various market participants peaked.

[26] If the errors are clustered, the likelihood ratio test is presented as a Wald test in STATA.

maximum likelihood estimation for a non-random self-selection of funds into CDS use and reported in column (5). In column (2), one can observe that managers who are older or more experienced in advising top100 funds are more likely to stay net short in CDS. A comparable result is observable for managers with more assets under their management and for managers who obtained a PhD. Regarding economic importance, managers who are ten years older than the average age of 44.5 years are 10% more likely to stay net short in CDS, while a one year increase in a manager's experience as related to a mean experience of 2.55 years would make it around 7% more likely for a fund to stay net short in CDS. Similarly, a 10% increase in the logarithm of AUM as related to its mean, that is equivalent to an increase in assets under management from 5,526 (mio. $) to 13,081 (mio. $), would increase the probability to stay net short in CDS by 7%. The presence of managers who obtained a PhD makes it 19% more likely to stay net short in CDS. On the one hand, this confirms hypothesis III assuming that younger managers are less likely to use CDS for risk-increasing purposes. On the other hand, the results suggest that CDS using managers who are older, have higher experience or professional skill do not shy away from applying risk-increasing strategies, which might be due to their lower sensitivity to performance-based termination. As shown by Adam and Guettler (2014), these types of strategies resulted in significant losses during the 2007-2009 financial crisis. The marginal effects reported on team management and women dummy variables are insignificantly negative. Thus, it cannot be confirmed that a team management structure or women in management significantly decrease the probability of a fund to stay net short in CDS, as presumed under hypotheses IV and V.

By contrast, funds advised by managers who obtained a degree at a top 20 U.S. university or that have managers who advise fewer (e.g. only one particular fund) as opposed to multiple funds are less likely to stay net short in CDS. These variables decrease the probability to stay net short in CDS, ceteris paribus, by ca. 13% and 27%, respectively.[27] As shown in column (5), the aforementioned results, except for managers with a PhD degree, remain constant even after accounting for the non-random, self-selection of funds into CDS use, although the size of the effects decreases by around 40%. Following the results of the likelihood ratio test presented as a Wald test, using a Heckman model is superior to estimating two independent equations. In this case, the pseudo R-squared is determined based on the Chi-square test statistics as suggested by Aldrich and Nelson (1984) (see Veall and Zimmermann (1996) for an overview). Hence, as opposed to older, more experienced or professionally successful managers, those who are younger or better educated (as measured by

[27] Once the turnover ratio is replaced by its adjusted version, as seen in column (4) of **Table 5**; the correlation between the direction of CDS use and the presence of managers who advise fewer (e.g. only one particular fund) as opposed to multiple funds becomes insignificant, which might be associated with the time period analyzed (2006-2010).

university prestige) shy away from staying net short in CDS, possibly due to concerns over their careers (Chevalier and Ellison (1999a, 1999b)).

In addition to these findings, if funds are part of a fund complex they are 36% more likely to stay net short in CDS. If funds are at least 10 years older than the average fund age of 20 years, they are 7% more likely to stay short in CDS.[28] Well established funds operating a derivative trading desk possibly have the experience to use net short CDS for a variety of purposes as opposed to their counterparts. By contrast, CDS use decreases by 24% and 14%, respectively, for investment grade funds and for funds that use other types of derivatives in parallel. From the viewpoint of investors, one would expect investment grade funds to not to engage in risk-increasing derivative strategies, while funds already using other derivatives possibly do not see the need to use CDS.

Moreover, the coefficients typically reported for the conditional fixed effects logit model do not show any significant correlations between the previously analyzed determinants and the decision to stay net short in CDS (not reported). For the subgroup of funds that switch between staying net short and net long in CDS, this indicates that either fixed effects or a wide heterogeneity of reasons influence CDS use.

In **Table 6** the "CDS net short" dummy is replaced by the respective net CDS use (long – short notional as related to TNA) variable ("CDS net/TNA"). Columns (1)-(4) show the results of OLS regressions, while columns (3)-(4) also include fixed effects. Again, the analysis performed in column (2) is extended by applying the Heckman correction (Heckman (1976, 1979)) based on maximum likelihood estimation for a non-random self-selection of funds into CDS use and reported in column (5). Additionally, it should be noted that the CDS net notional is positive (negative) whenever funds are net long (net short). Thus, by looking at the coefficients, one cannot distinguish whether the variables of interest are increasing net short CDS or decreasing net long CDS positions (or vice versa) during this time.

From **Table 5**, it is shown that managers educated at prestigious universities or those who advise fewer funds (e.g., only one particular fund as opposed to multiple funds) are less likely to stay net short in CDS. Thus, as indicated in column (2) of **Table 6**, the net long CDS positions of funds are more often increased (than net short CDS decreased) by economically high ca. 0.0410 and 0.0397 of TNA, respectively. **Table 6** presents, in comparison with **Table 5,** that funds are more likely to stay net short in CDS when the experience of a management team (or manager) is increased, leading to higher net

[28] The same analysis performed considering an adjusted turnover ratio confirms the results for these variables, except for fund age, which might be associated with the period analyzed (2006-2010).

short CDS positions of ca. 0.0135 per 1 year of additional experience (lower levels of net long positions occur less often). This result is in line with previous literature that suggests that longer tenured managers have a higher inclination towards risk. Nevertheless, a more in depth analysis of the asset allocations of funds might reveal a large heterogeneity in terms of applied strategies based on short CDS (as presented in section 2). There is an additional effect observable for managers who obtained a master's degree: They tend to have either smaller net long or higher net short positions in CDS (by. ca. 0.0410 of TNA). Other variables identified to affect a fund's decision to stay net short in CDS (PhD title, manager age) do not affect the extent of net CDS use. If considering the Heckman correction for self-selection of funds into CDS use, the aforementioned results remain stable and comparable in size (**Table 6**, column (5)); the results from the selection equation are similar to those reported in column (3) of **Table 3**. Additionally, the occurrence of a woman in management, which was identified to decrease the extent of CDS, leads either to higher net long or lower net short positions in CDS (by ca. 0.0629 of TNA). As suggested by the likelihood ratio test presented as a Wald test (reported at the bottom of **Table 6**), the Heckman method is more preferable than estimating two independent equations and together with the inverse of the Mill's ratio from the selection equation controlling for self-selection is recommendable.

Furthermore, funds belonging to a bigger complex that are more likely to stay net short in CDS also keep higher net short (and less often lower net long) CDS positions (by ca. 0.0551 of TNA). On the contrary, investment grade funds are less likely to stay net short in CDS; thus, their net long CDS positions are higher (and less often net short CDS positions lower) by ca. 0.0662 of TNA. In addition, a higher turnover ratio of funds, which does not affect a fund's decision to use or stay net short in CDS, either increases net short or decreases net long positions in CDS (by ca. 0.0098 of TNA per 10% higher turnover ratio). This suggests that funds which are more active in trading tend to use slightly more short CDS because of the higher expected transaction cost efficiency, which might manifest, e.g., when funds substitute direct investments into securities indirectly via CDS (e.g., Stulz (2010)).

The results of the fixed effects regression are reported in column (4) of **Table 6** and support previous findings regarding managers who hold a master's degree, have higher experience or those who advise only one particular fund as opposed to multiple funds. During the period considered, funds with above period average of more experienced managers or managers with master's degree decrease net long and increase net short CDS positions, while managers that advise fewer funds affect these CDS positions in the opposite direction. In addition, incorporating managers with a PhD title, who are more likely to stay net short in CDS, increases the respective positions in CDS considerably. By contrast, the presence of women in management leads to either an increase in net long or a decrease

in net short positions in CDS. On the fund level, both an increase in fund age and an increase in the turnover ratio decrease net long or increase net short CDS positions.

Overall, certain manager characteristics affect a fund's decision to stay net short in CDS and the extent of net CDS use. For example, funds with more experienced managers, who are more likely to stay net short in CDS, tend to have higher CDS net short positions in relation to a fund's net assets, on average. By contrast, the opposite behavior is observable with regard to staying net short in CDS and extending net short CDS use for managers who obtained a degree from a prestigious university or advise one instead of multiple funds. Further research should focus more on the interaction between manager characteristics and the investment strategies implemented by funds.

6 Conclusion

This study focuses on an extended set of potential determinants of the choice of U.S. corporate bond funds to use CDS between 2004 and 2010. Of particular interest is the extent of total and net CDS use, including long and short CDS written on single- and multi-name references. I find that fund age, the fraction of institutional investors, and parallel investments into other derivatives positively correlate with the decision of funds to use CDS. Furthermore, the probability to use CDS is, ceteris paribus, positively affected by having a single manager instead of a team in place as well as the presence of a manager with a master's degree or who obtained a degree from a top 20 U.S. university. Thus, managers with a better quality of education/network and know how to use derivatives are more likely to use these complex instruments as part of portfolio management. However, none of the manager characteristics that are identified to increase the probability to use CDS influence the size of the CDS holdings. Instead, it is observable that the presence of women in management negatively affects the size of CDS holdings, while the presence of more experienced managers has the opposite effect. In addition to these findings, the extent of CDS use is significantly positively affected by a higher fraction of institutional holdings, higher fund outflows and parallel use of other derivatives. Thus, managers who tend to use CDS often keep neither the highest nor the lowest positions in CDS, which is supportive for a wide heterogeneity in terms of size of CDS positions across the funds and time. In particular, during the height of the crisis in 2008, a significant increase in short CDS written on multi-name underlying positions and long CDS written on single-name references is observable.

As opposed to managers who obtained a degree from a prestigious university, successful managers having higher assets under their management and more experienced managers are more likely to stay net short in CDS. This suggests that young or better educated and networked managers behave differently than more experienced managers, possibly because of diverging career concerns (e.g., due

to the risk of termination). It is also shown that more experienced managers tend to have higher risk-increasing CDS net short positions in relation to a fund's net assets on average, while mangers who obtained a degree from a prestigious university or advise fewer funds behave in the opposite way. However, it remains unknown whether or not short CDS are mainly used by funds to replicate securities or to create additional leverage in order to boost returns. Further research should focus on analyzing changes in the asset allocations of funds based on portfolio holdings data to better understand the investment strategies implemented by funds.

Knowledge about the interaction of specific manager characteristics and funds investment strategies is important for the public and regulators since, in the interest of investor protection, strategies that have a high potential for loss could be better limited by fund boards via internal restrictions.

Appendix A

This appendix lists the variables I used in the empirical study and explains their construction. The sample period starts in the 3rd quarter of 2004 and ends in the 4th quarter of 2010.

Credit Default Swaps (CDS) using funds: corporate bond funds that used CDS at least once during the time between 2004 and 2010.

CDS Dummy: a dummy variable indicating whether or not a corporate bond fund used CDS in a particular quarter between 2004 and 2010.

CDS net short: a dummy variable indicating whether or not a corporate bond fund stayed net short in CDS in a particular quarter between 2004 and 2010 (conditional on CDS use).

CDS notional: The notional position is determined based on aggregated (quarterly) long plus short CDS positions.

CDS net notional: The net notional position is determined based on aggregated (quarterly) long minus short CDS positions and includes, but is not limited to, offsetting positions. The CDS net notional is positive (negative) whenever funds are net long (net short).

CDS/TNA: notional amount of all CDS used by a fund in a particular quarter between 2004 and 2010 expressed as a fraction of a fund's TNA.

CDS net/TNA: net notional amount of all CDS (long – short positions) used by a fund in a particular quarter between 2004 and 2010 expressed as a fraction of a fund's TNA.

Long CDS: quarterly notional amount of all CDS as a fraction of a fund's TNA where a fund bought protection (based on items from periodic reports).

Short CDS: quarterly notional amount of all CDS as a fraction of a fund's TNA where a fund sold protection (based on items from periodic reports).

Long single-name CDS: quarterly notional amount of CDS as a fraction of a fund's TNA where a fund bought protection on a single-name underlying position, e.g., corporate bond or sovereign bond (based on items from periodic reports).

Long multi-name CDS: quarterly notional amount of CDS as a fraction of a fund's TNA where a fund bought protection on a multi-name underlying position, e.g., basket of bonds, asset-backed securities, CDS or bond indices (based on items from periodic reports).

Short single-name CDS: quarterly notional amount of CDS as a fraction of a fund's TNA where a fund sold protection on a single-name underlying position, e.g., corporate bond or sovereign bond (based on items from periodic reports).

Short multi-name CDS: quarterly notional amount of CDS as a fraction of a fund's TNA where a fund sold protection on a multi-name underlying position, e.g., basket of bonds, asset-backed securities, CDS or bond indices (based on items from periodic reports).

Long CDS offset: quarterly notional amount of long CDS offset by prevalent notional amount of short CDS positions as a fraction of a fund's TNA. In this situation, a fund bought protection on an underlying position of a particular issuer that offsets an existing (short) CDS position where a fund sold protection on an underlying position of a particular issuer. Issuers of CDS references from periodic reports are used to find offsetting CDS positions.

Long CDS non-offset: quarterly notional amount of long CDS not offset by prevalent notional amount of short CDS positions as a fraction of a fund's TNA. In this situation, a fund bought protection on an underlying position for other reasons than to offset existing (short) CDS positions. Issuers of CDS references from periodic reports are used to find offsetting CDS positions.

Short CDS offset: quarterly notional amount of short CDS offset by prevalent notional amount of long CDS positions as a fraction of a fund's TNA. In this situation, a fund sold protection on an underlying position of a particular issuer that offsets an existing (long) CDS position where a fund bought protection on an underlying position of a particular issuer. Issuers of CDS references from periodic reports are used to find offsetting CDS positions.

Short CDS non-offset: quarterly notional amount of short CDS not offset by prevalent notional amount of long CDS positions as a fraction of a fund's TNA. In this situation, a fund sold protection on an underlying position for other reasons than to offset existing (long) CDS positions. Issuers of CDS references from periodic reports are used to find offsetting CDS positions.

Fund TNA: total net asset value as provided by CRSP (summed up for all share classes of a fund) that is equal to total assets minus total liabilities in mio. of $ reflecting fund size.

Fund TNA (ln): fund size expressed as a natural logarithm of total net asset value.

Fund age: fund age expressed as the number of years an oldest share class of a fund is existing based on a fund's inception date as provided by CRSP.

Fund age (ln): fund age expressed as the natural logarithm of the number of years an oldest share class of a fund is existing based on a fund's inception date as provided by CRSP.

Turnover ratio: fund turnover ratio relating the minimum of aggregated sales or aggregated purchases of securities to the average 12-month total net assets of the fund as provided by CRSP.

Adj. turnover ratio: adjusted fund turnover ratio is the residual from the regression of turnover ratio on the average duration of funds (from Morningstar), which is available for the period 2006 to 2010.

Expense ratio: ratio of total investment that shareholders pay for the fund's operating expenses, which include 12b-1 fees (which may also include waivers and reimbursements) as of the most recently completed fiscal year (provided by CRSP in % of a fund's TNA).

Investment grade: dummy variable indicating whether a bond fund is primarily invested in securities rated investment-grade (IG) or a high-yield (HY) based on Lipper classes provided by CRSP. E.g., the IG category contains the following Lipper classes: Corporate Debt Funds A-rated, Corporate Debt Funds BBB-rated, Short Investment Grade Debt Funds, Short-Intermediate Investment Grade Debt Funds, Intermediate Investment Grade Debt Funds, while the HY category contains Multi-Sector Income Funds and High Current Yield Funds.

Institutional investments (fraction of TNA): variable indicating the fraction of TNA held by institutional investors determined based on CRSP's classification of fund share classes as institutional.

Other derivatives: dummy variable indicating whether a fund uses derivatives other than CDS as reported in N-SAR Forms.

Single manager: dummy variable indicating whether a fund is managed by a single manager or a team in a particular quarter as stated in Morningstar.

Team: dummy variable indicating whether a bond fund is managed by a team or a single manager in a particular quarter as stated in Morningstar.

Female manager / female manager (dummy): variable indicating the fraction of women in a management team (including a single female manager) managing a fund in a particular quarter as stated in Morningstar. However, for regression analysis, a female manager dummy is created that indicates whether at least one woman occurs in a particular period as a fund manager.

Top20 U.S. university (dummy) / top20 university team-adjusted (dummy): dummy variable indicating whether a manager obtained an educational degree at a university that belongs to the top 20 U.S. universities (determined according to Business Week Rankings in 2008 and 2010, and university information provided by Morningstar). However, in regression analysis for teams, a dummy is created showing whether the majority of team members have obtained a degree from a top 20 U.S. university.

Manager degree (dummy) / master degree team-adjusted (dummy): dummy variable indicating the highest university degree obtained by a manager (in case of a management team, it is determined as the mean) as provided by Morningstar. However, in regression analysis for teams, a dummy is created showing whether the majority of team members has obtained a master's (in addition to having a bachelor's) degree.

PhD degree (dummy) / PhD team-adjusted (dummy): dummy variable indicating the highest university degree obtained by a manager (in case of a management team, it is determined as the mean) as provided by Morningstar. However, in regression analysis for teams, a dummy is created showing whether or not at least one person has obtained this degree.

Manager age: manager age expressed by the number of years as determined based on Morningstar data for education year and highest degree reached (as suggested by Chevalier and Ellison (1999a), e.g. bachelor + 21 years).

Manager experience: manager experience expressed by the number of years a manager (in the case of a management team, it is determined as the mean) spend on managing one of the largest 100 corporate bond funds between mid-2004 and 2010.

Assets under management (AUM): assets under the management of a single manager (in mio. of $) determined as the sum of the 100 largest corporate bond funds' net assets advised by this manager in a particular reporting period as provided by Morningstar and based on CRSP data (as suggested by Wu, Wermers, and Zechner (2013)). Similarly, the AUM of a management team is determined as the mean of AUM managed by all team members in a particular reporting period.

Assets under management (ln): natural logarithm of assets under management of a single manager determined for the 100 largest corporate bond funds' net assets advised by this manager in a particular reporting period as provided by Morningstar and based on CRSP data. Similarly, ln AUM of a management team is determined as the natural logarithm of the mean AUM managed by all team members in a particular reporting period.

TNA/AUM: variable indicating the relation of a particular fund's TNA to the assets under the control of an individual manager (or team of managers) in a quarter.

Past flows: past quarter's net fund flows determined based on total monthly fund in- and outflows from CRSP ((TNA_t – TNA_t-1(1 + monthly fund return_t))/TNA_t-1, e.g. Sirri and Tufano (1988)).

Return: three months fund return calculated from total monthly returns as provided by CRSP.

Standard deviation: standard deviation of daily fund returns for a fund's largest share class over the last three months.

1F-alpha: outcome of the regression of the daily excess return on a constant and the daily excess returns of the Barclays Capital U.S. Aggregate Bond Index over 3 and 6, months (Adam and Guettler (2014)).

4F-alpha: outcome of the regression of the daily excess return on a constant, the daily excess returns of the Barclays Capital U.S. Aggregate Bond Index extended by three additional risk factors: the stock market index (CRSP value-weighted returns, all stocks listed at NYSE/AMEX/NASDAQ), the yield spread between the Barclay's Capital U.S. Mortgage-Backed Securities Index and the risk-free rate, and the spread between the Barclays Capital U.S. Corporate High-Yield index and the Barclays Capital U.S. Intermediate Government/Credit index over 3 and 6 months (Adam and Guettler (2014)).

Appendix B: Industries of issuers being referenced via single-name CDS (as measured by no. of contracts and notional amount in relation to a fund's TNA per CDS reference issuer)

Variable	All industries		Non-Durables		Durables		Manufacturing		Energy		Chemicals		B. Equipment	
All CDS user	N	mean	N	mean	N	mean	N	mean	N	mean	N	mean	N	mean
CDS net notional / TNA	15475	-0.00056	597	0.00015	498	-0.00302	729	0.00018	585	-0.00038	202	0.00023	654	-0.00038
Long CDS notional / TNA	15475	0.00093	597	0.00126	498	0.00106	729	0.00130	585	0.00082	202	0.00102	654	0.00095
Offsetting long CDS notional / TNA (= short CDS)	15471	0.00005	597	0.00006	498	0.00061	729	0.00004	585	0.00001	202	0.00000	654	0.00003
Non-offsetting long CDS notional / TNA	15471	0.00088	597	0.00119	498	0.00045	729	0.00126	585	0.00082	202	0.00101	654	0.00093
Short CDS notional / TNA	15475	-0.00149	597	-0.00111	498	-0.00407	729	-0.00112	585	-0.00120	202	-0.00078	654	-0.00133
Non-offsetting short CDS notional / TNA	15471	-0.00144	597	-0.00104	498	-0.00347	729	-0.00108	585	-0.00119	202	-0.00078	654	-0.00131

Variable	Telecomm.		Utilities		Stores		Health		Finance		Others		Sovereigns	
All CDS user	N	mean	N	mean	N	mean	N	mean	N	mean	N	mean	N	mean
CDS net notional / TNA	672	-0.00078	686	-0.00165	1157	0.00143	317	-0.00034	4593	-0.00103	3574	0.00016	1211	-0.00222
Long CDS notional / TNA	672	0.00083	686	0.00027	1157	0.00178	317	0.00080	4593	0.00104	3574	0.00066	1211	0.00054
Offsetting long CDS notional / TNA (= short CDS)	672	0.00006	686	0.00002	1157	0.00001	317	0.00003	4593	0.00003	3570	0.00002	1211	0.00009
Non-offsetting long CDS notional / TNA	672	0.00077	686	0.00026	1157	0.00177	317	0.00077	4593	0.00101	3570	0.00064	1211	0.00045
Short CDS notional / TNA	672	-0.00161	686	-0.00193	1157	-0.00035	317	-0.00114	4593	-0.00208	3574	-0.00049	1211	-0.00276
Non-offsetting short CDS notional / TNA	672	-0.00155	686	-0.00191	1157	-0.00034	317	-0.00110	4593	-0.00204	3570	-0.00047	1211	-0.00267

Figure 1: The development of the number of U.S. funds reporting CDS between 2004 and 2010

This figure shows the fraction of U.S. corporate bond funds reporting CDS at period end between 2004 and 2010. Overall, 69 out of 100 funds use CDS at some point in time between 2004 and 2010.

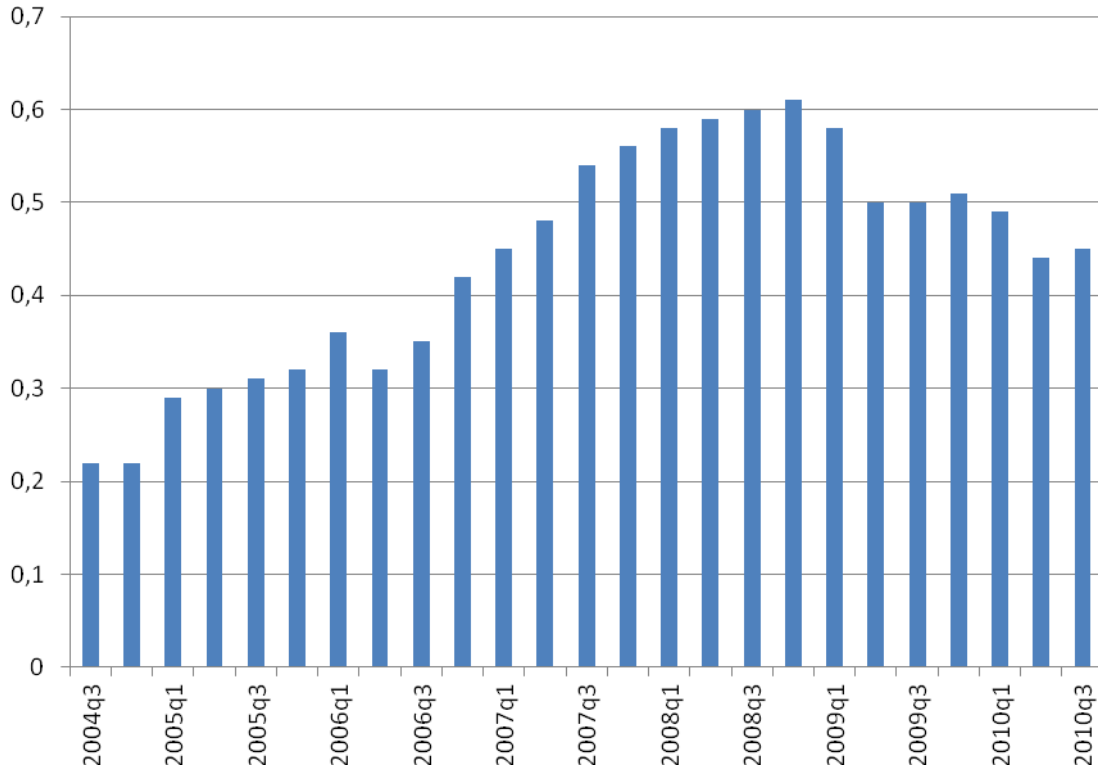

Figure 2: The development of long and short CDS positions of U.S. funds between 2004 and 2010

This figure shows the development of funds' average CDS long and short positions together with the net notional amount (long – short positions) conditional on CDS use in a particular period, and the level of the general credit risk premium represented by BBB yield – Treasury yield between 2004 and 2010. CDS notional amounts are normalized by a fund's total net asset value (TNA).

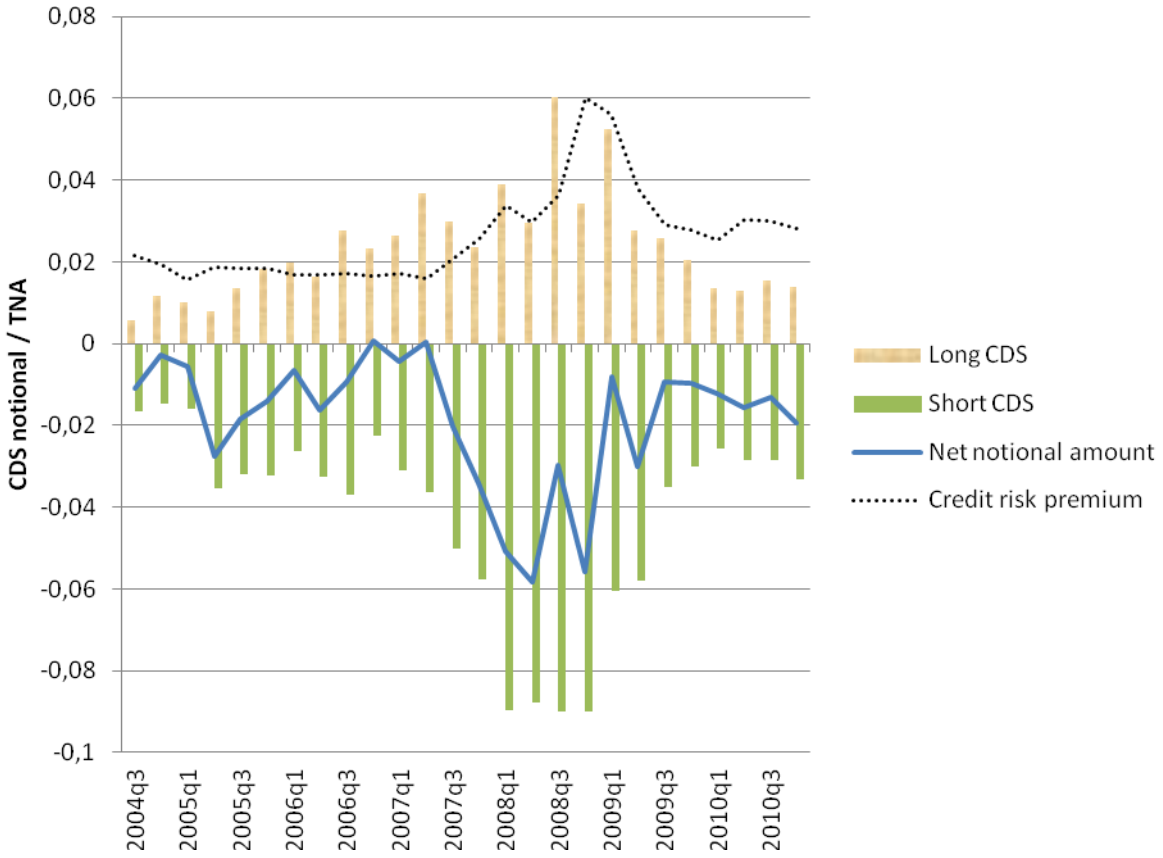

Figure 3: The development of long and short CDS positions written on single-name references of U.S. funds between 2004 and 2010

This figure shows the development of funds' average CDS long and short positions written on single-name references conditional on CDS use in a particular period between 2004 and 2010. The corresponding median figures are represented by the dotted lines. CDS notional amounts are normalized by a fund's total net asset value (TNA).

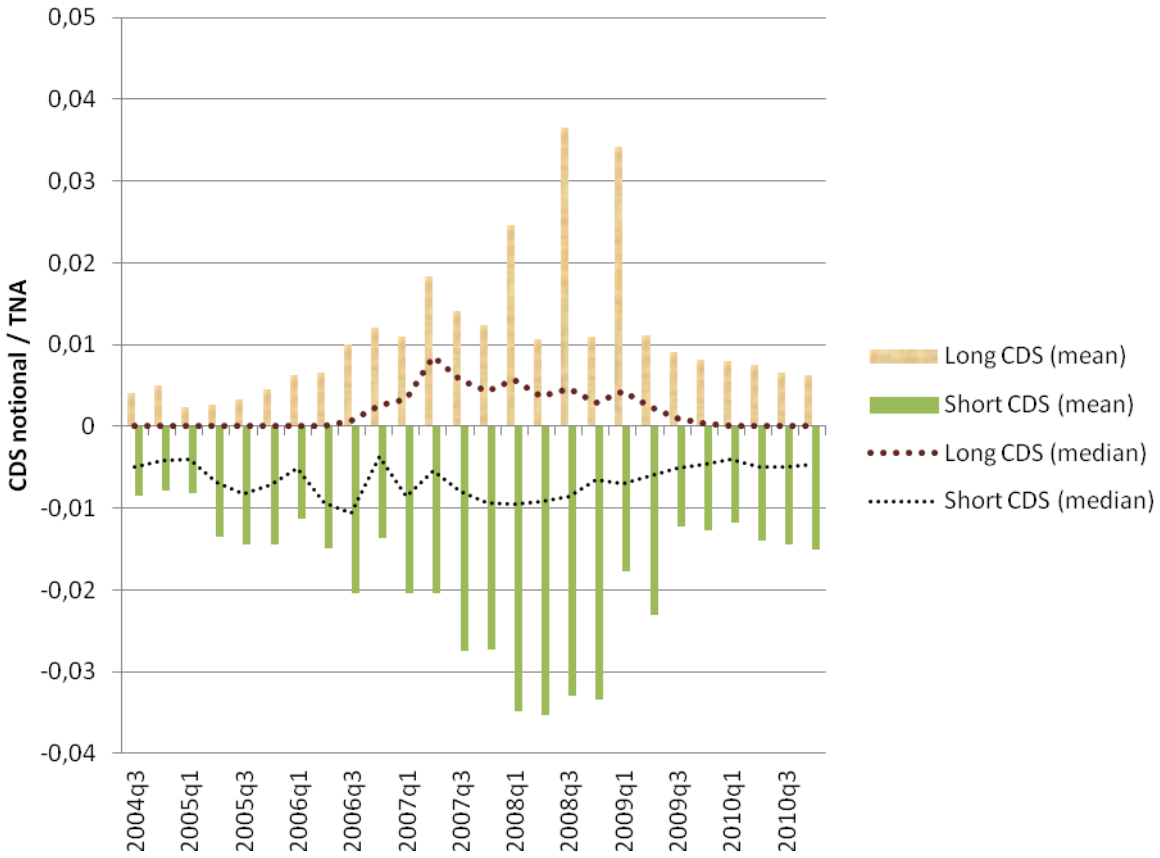

Figure 4: The development of long and short CDS positions written on multi-name references of U.S. funds between 2004 and 2010

This figure shows the development of funds' average CDS long and short positions written on multi-name references conditional on CDS use in a particular period between 2004 and 2010. The corresponding median figures are represented by the dotted lines. CDS notional amounts are normalized by a fund's total net asset value (TNA).

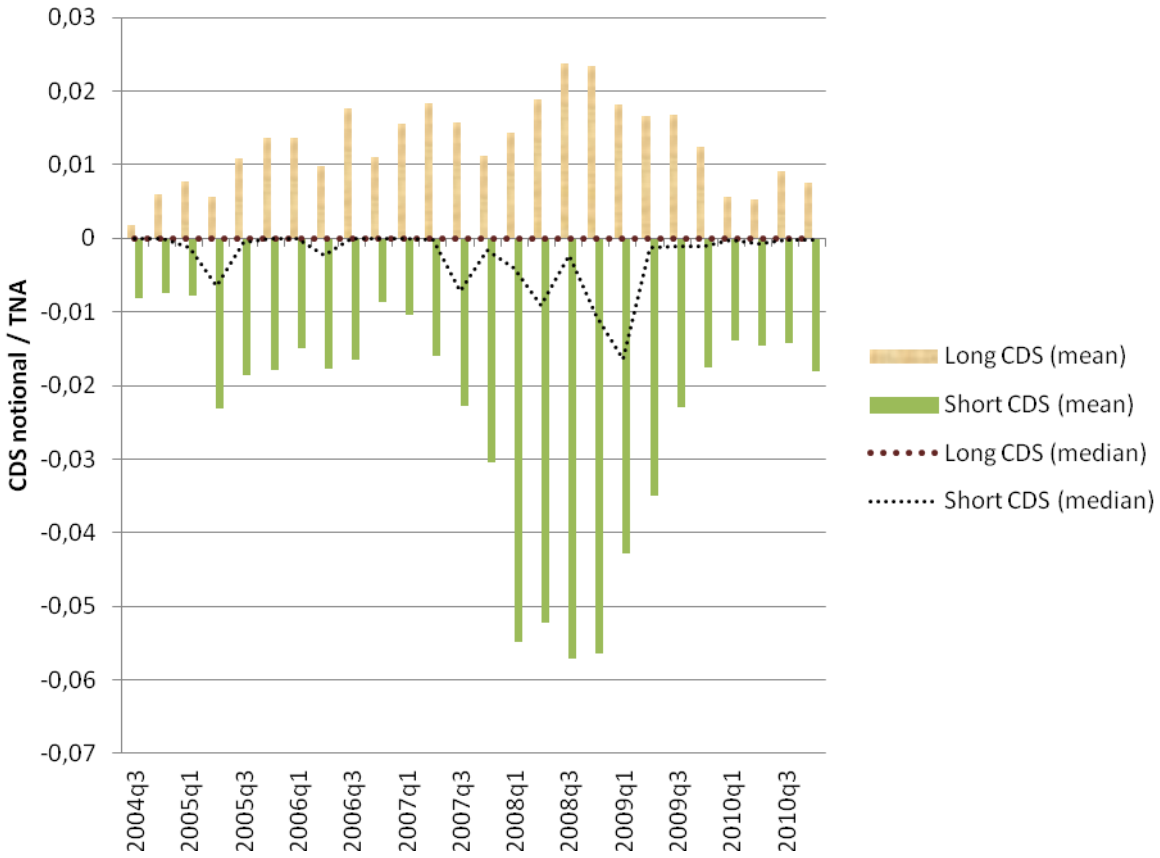

Table 1: CDS use in general (as measured by notional amount in relation to a fund's TNA)

This table shows the funds' average total CDS, net CDS (long - short positions), CDS long and short positions written on single- and multi-name references together with the parts non-offset by the respective short and long CDS written on the same issuer references in a particular period between 2004 and 2010 for all CDS using funds, CDS using funds staying net short or net long in CDS in a particular period, respectively. CDS notional amounts are normalized by a fund's total net asset value (TNA). The last row shows the unrealized appreciation/depreciation from CDS at reporting date expressed by CDS fair values in relation to a fund's TNA. For the definitions of all variables please refer to Appendix A.

Variable	N	mean	sd	min	p50	max	N	mean	sd	min	p50	max	N	mean	sd	min	p50	max
	All CDS using funds						CDS using funds staying net short						CDS using funds staying net long					
CDS notional / TNA	1768	0.0476	0.1210	0.0000	0.0090	1.2896	791	0.0736	0.1454	0.0001	0.0271	1.2731	356	0.0728	0.1403	0.0009	0.0310	1.2896
CDS net notional / TNA	1768	-0.0135	0.0843	-0.9270	0.0000	1.1035	791	-0.0480	0.0929	-0.9270	-0.0193	-0.0001	356	0.0397	0.1020	0.0000	0.0137	1.1035
Long CDS	1768	0.0170	0.0616	0.0000	0.0000	1.1965	791	0.0128	0.0397	0.0000	0.0000	0.4288	356	0.0560	0.1153	0.0000	0.0244	1.1965
Long single-name CDS	1768	0.0081	0.0486	0.0000	0.0000	1.1965	791	0.0048	0.0105	0.0000	0.0000	0.0843	356	0.0298	0.1044	0.0000	0.0089	1.1965
Long multi-name CDS	1768	0.0089	0.0347	0.0000	0.0000	0.4128	791	0.0080	0.0338	0.0000	0.0000	0.4128	356	0.0262	0.0548	0.0000	0.0000	0.4118
Long multi-name CDS (ABS)	1768	0.0011	0.0068	0.0000	0.0000	0.1577	791	0.0010	0.0054	0.0000	0.0000	0.0840	356	0.0031	0.0125	0.0000	0.0000	0.1577
Long CDS offsetting	1768	0.0029	0.0144	0.0000	0.0000	0.2951	791	0.0043	0.0171	0.0000	0.0000	0.2951	356	0.0051	0.0189	0.0000	0.0000	0.1574
Long CDS non-offsetting	1768	0.0141	0.0561	0.0000	0.0000	1.1965	791	0.0085	0.0279	0.0000	0.0000	0.3417	356	0.0509	0.1101	0.0000	0.0240	1.1965
Short CDS	1768	0.0305	0.0842	0.0000	0.0026	0.9706	791	0.0608	0.1154	0.0001	0.0232	0.9706	356	0.0163	0.0420	0.0000	0.0023	0.4072
Short single-name CDS	1768	0.0130	0.0444	0.0000	0.0000	0.8022	791	0.0269	0.0633	0.0000	0.0118	0.8022	356	0.0049	0.0100	0.0000	0.0000	0.0673
Short multi-name CDS	1768	0.0174	0.0605	0.0000	0.0000	0.7974	791	0.0338	0.0835	0.0000	0.0062	0.7974	356	0.0114	0.0391	0.0000	0.0000	0.3989
Short multi-name CDS (ABS)	1768	0.0034	0.0202	0.0000	0.0000	0.3914	791	0.0060	0.0280	0.0000	0.0000	0.3914	356	0.0036	0.0162	0.0000	0.0000	0.1927
Short CDS offsetting	1768	0.0029	0.0144	0.0000	0.0000	0.2951	791	0.0043	0.0171	0.0000	0.0000	0.2951	356	0.0051	0.0189	0.0000	0.0000	0.1574
Short CDS non-offsetting	1768	0.0275	0.0762	0.0000	0.0023	0.9433	791	0.0565	0.1054	0.0001	0.0226	0.9433	356	0.0112	0.0273	0.0000	0.0018	0.2498
All CDS (fair value/a fund's TNA)	1768	-0.0019	0.0173	-0.5230	0.0000	0.1507	791	-0.0032	0.0176	-0.3240	-0.0001	0.1507	356	-0.0026	0.0279	-0.5230	-0.0001	0.0121

Table 2: Summary statistics

This table shows the summary statistics for all variables referred to in the study, which are described in detail in Appendix A. The last two columns show the p-values of the T-test and Wilcoxon rank-sum (WRS) test, respectively. T-test performs a t-test on the equality of means within two groups, while the WRS-test tests the hypothesis that two independent samples are from populations with the same distribution.

	All funds				Funds non-using CDS				Funds using CDS					
	N	mean	sd	p50	N	mean	sd	p50	N	mean	sd	p50	T-test	WRS-test
Fund TNA (in $ mio.)	2557	5,842	15,716	2,314	789	7,247	10,997	3,634	1,768	5,214	17,381	1,864	0.0004	0.0000
Fund TNA (ln TNA)	2557	7.8954	1.0614	7.7466	789	8.2847	1.0338	8.1981	1768	7.7217	1.0271	7.5303	0.0000	0.0000
Fund age (years)	2557	21.8694	10.4047	20.0000	789	20.6464	9.3151	19.0000	1768	22.4152	10.8137	20.0000	0.0000	0.0007
Fund age (ln)	2557	2.9798	0.4644	2.9957	789	2.9183	0.4836	2.9444	1768	3.0072	0.4531	2.9957	0.0000	0.0007
Institutional investments (fraction of TNA)	2557	0.3338	0.3875	0.1251	789	0.1962	0.2870	0.0566	1768	0.3952	0.4101	0.1967	0.0000	0.0000
Expense ratio (in %)	2557	0.7788	0.3427	0.7411	789	0.7658	0.3907	0.7800	1768	0.7846	0.3189	0.6929	0.2358	0.5628
Turnover ratio	2557	1.4238	1.5867	0.8200	789	0.9317	1.4309	0.5100	1768	1.6434	1.6039	1.0600	0.0000	0.0000
Adjusted turnover ratio	1794	0.0000	1.6693	-0.6225	476	-0.4888	1.5817	-0.9411	1318	0.1765	1.6656	-0.4211	0.0000	0.0000
Investment grade (dummy)	2557	0.6117	0.4875	1.0000	789	0.4613	0.4988	0.0000	1768	0.6787	0.4671	1.0000	0.0000	0.0000
Big fund family (dummy)	2557	0.7458	0.4355	1.0000	789	0.6046	0.4893	1.0000	1768	0.8088	0.3933	1.0000	0.0000	0.0000
Single manager	2549	0.3672	0.4821	0.0000	789	0.3878	0.4876	0.0000	1760	0.3580	0.4795	0.0000	0.1508	0.1481
Female manager	2533	0.0642	0.1694	0.0000	773	0.1083	0.2407	0.0000	1760	0.0449	0.1211	0.0000	0.0000	0.0000
Female manager (dummy)	2549	0.1844	0.3879	0.0000	789	0.2636	0.4409	0.0000	1760	0.1489	0.3561	0.0000	0.0000	0.0000
No. of managers	2549	2.8745	2.2239	2.0000	789	2.6046	2.0008	2.0000	1760	2.9955	2.3073	2.0000	0.0000	0.0001
Assets under management (AUM, in $ mio.)	2549	18,219	41,349	4,893	789	13,937	19,204	5,379	1,760	20,139	47,953	4,473	0.0000	0.0000
Assets under management (ln AUM)	2549	8.6835	1.3286	8.4955	789	8.8313	1.1596	8.5903	1760	8.6172	1.3929	8.4057	0.0001	0.0000
Fraction TNA to AUM	2549	0.3519	0.3260	0.2020	789	0.4125	0.3240	0.3333	1760	0.3247	0.3233	0.1939	0.0000	0.0000
Top 20 university (dummy)	2533	0.5081	0.3964	0.5000	773	0.5012	0.4005	0.5000	1760	0.5111	0.3947	0.5000	0.5633	0.5119

	All funds				Funds non-using CDS				Funds using CDS					
	N	mean	sd	p50	N	mean	sd	p50	N	mean	sd	p50	T-test	WRS-test
Master degree (dummy)	2533	0.7401	0.3425	1.0000	773	0.7541	0.3338	1.0000	1760	0.7339	0.3462	1.0000	0.1658	0.1711
PhD degree (dummy)	2533	0.0334	0.1443	0.0000	773	0.0606	0.2087	0.0000	1760	0.0214	0.1020	0.0000	0.0000	0.0000
Top 20 university team-adjusted (dummy)	2557	0.5487	0.4977	1.0000	789	0.5412	0.4986	1.0000	1768	0.5520	0.4974	1.0000	0.6113	0.6108
Master degree team-adjusted (dummy)	2557	0.7622	0.4258	1.0000	789	0.7465	0.4353	1.0000	1768	0.7692	0.4214	1.0000	0.2186	0.2127
PhD degree team-adjusted (dummy)	2557	0.0919	0.2889	0.0000	789	0.1508	0.3581	0.0000	1768	0.0656	0.2477	0.0000	0.0000	0.0000
Manager age (years)	2207	43.9554	7.6698	42.5000	683	42.6218	6.6682	42.0000	1524	44.5531	8.0087	43.0000	0.0000	0.0009
Manager of top 100 experience (years)	2549	2.5738	1.6767	2.2000	789	2.6185	1.6734	2.5000	1760	2.5537	1.6782	2.0000	0.3667	0.2902
Other derivatives (dummy)	2318	0.4814	0.4998	0.0000	736	0.1603	0.3672	0.0000	1582	0.6308	0.4827	1.0000	0.0000	0.0000
Fund Flow (quarterly)	2555	-0.0016	0.1041	-0.0054	787	0.0093	0.0792	0.0027	1768	-0.0065	0.1131	-0.0110	0.0001	0.0000
Raw return (quarterly)	2557	0.0155	0.0409	0.0138	789	0.0172	0.0442	0.0154	1768	0.0148	0.0394	0.0131	0.1906	0.0681
Standard deviation	2557	0.0028	0.0069	0.0022	789	0.0027	0.0019	0.0022	1768	0.0029	0.0082	0.0022	0.3193	0.2520
1F-alpha (3 months)	2557	0.0001	0.0013	0.0000	789	0.0001	0.0008	0.0001	1768	0.0001	0.0015	0.0000	0.2463	0.0014
4F-alpha (3 months)	2557	0.0000	0.0012	0.0000	789	0.0000	0.0003	0.0000	1768	0.0000	0.0015	0.0000	0.7425	0.1961
1F-alpha (6 months)	2557	0.0001	0.0007	0.0000	789	0.0001	0.0007	0.0001	1768	0.0001	0.0007	0.0000	0.0319	0.0014
4F-alpha (6 months)	2557	0.0000	0.0005	0.0000	789	0.0000	0.0002	0.0000	1768	0.0000	0.0006	0.0000	0.7103	0.0106

Table 3: Determinants of the Decision to Use CDS

This table reports the marginal effects of determinants of a fund's decision to use CDS in a particular period (CDS Dummy) from logit regressions. As compared to columns (1)-(2), columns (3)-(4) also contain a proxy for a fund's use of derivatives other than CDS. In columns (5)-(6), the turnover ratio is replaced by the adjusted turnover ratio. For the definitions of all variables, please refer to Appendix A. All regressions contain time fixed effects. Standard errors are clustered at the fund level. *,**,*** indicate significance at the 10, 5, and 1% level, respectively; z-scores are provided in parentheses.

	(1)	(2)	(3)	(4)	(5)	(6)
	CDS Dummy	**CDS Dummy**	**CDS Dummy**	**CDS Dummy**	**CDS Dummy**	**CDS Dummy**
Big fund family (dummy)	0.2640***	0.1740**	0.1990**	0.1030	0.2330**	0.1310
	(3.0600)	(2.0600)	(2.1900)	(1.2200)	(2.4500)	(1.3700)
Fund TNA (ln)	-0.0078		-0.0027		-0.0003	
	(-0.2200)		(-0.0900)		(-0.0100)	
Fund age (ln)	0.1940**	0.2490***	0.1860**	0.2610***	0.2160**	0.3350***
	(2.4500)	(3.0000)	(2.3600)	(3.2200)	(2.4200)	(3.5100)
Institutional investments	0.1850*	0.2800***	0.1510*	0.2720***	0.1770*	0.2950***
	(1.9300)	(3.2700)	(1.7200)	(3.2000)	(1.7800)	(2.9900)
Investment grade (dummy)	0.1540*	0.1880**	0.0458	0.0869	0.0088	0.0495
	(1.8300)	(2.3100)	(0.4800)	(0.9600)	(0.0800)	(0.4300)
Turnover ratio	0.0634*	0.0810**	0.0292	0.0431		
	(1.8300)	(2.0600)	(0.9600)	(1.0900)		
Adj. turnover ratio					0.0336	0.0527
					(0.9100)	(1.2300)
Expense ratio	0.0529	0.2680*	-0.0427	0.1470	-0.0179	0.0962
	(0.3500)	(1.7100)	(-0.2800)	(0.9900)	(-0.1000)	(0.5100)
Past fund flow	0.0579	0.1460	-0.0330	0.0063	0.0650	0.0797
	(0.5100)	(1.2500)	(-0.3200)	(0.0700)	(0.6700)	(0.8100)
Other derivatives (dummy)			0.2560***	0.2350***	0.2610***	0.2400***
			(4.4300)	(3.9700)	(3.8900)	(3.7900)
Top20 U.S. university degree (dummy)		0.1250**		0.1230**		0.0804
		(2.1800)		(2.0500)		(1.4100)
Master degree (dummy)		0.1490**		0.1370**		0.1970***
		(2.2900)		(2.2600)		(3.0200)

	(1)	(2)	(3)	(4)	(5)	(6)
	CDS Dummy	**CDS Dummy**	**CDS Dummy**	**CDS Dummy**	**CDS Dummy**	**CDS Dummy**
PhD degree (dummy)		0.0819		0.0967		0.1950*
		(0.7400)		(1.0200)		(1.9100)
Assets under management (ln AUM)		-0.0213		-0.0115		-0.0203
		(-0.6000)		(-0.3500)		(-0.5600)
TNA/AUM		-0.2050		-0.2510		-0.2890*
		(-1.2400)		(-1.6400)		(-1.6500)
Manager age		0.0067		0.0023		0.0026
		(1.4100)		(0.4900)		(0.4700)
Manager experience		-0.0185		-0.0165		-0.0141
		(-0.8200)		(-0.8300)		(-0.6100)
Team managed (dummy)		-0.1760**		-0.2050***		-0.2560***
		(-2.0900)		(-2.7100)		(-2.7400)
Female (dummy)		-0.1400		-0.1290		-0.1370
		(-1.5800)		(-1.5500)		(-1.3700)
Observations	**2455**	**2121**	**2235**	**1957**	**1620**	**1406**
Pseudo R-squared	**0.1923**	**0.2803**	**0.2364**	**0.3166**	**0.2322**	**0.3140**

Table 4: Determinants of the Extent of Use of Total CDS

This table reports the results of OLS regressions excluding and including fund fixed effects of various determinants on a fund's extent of CDS use as measured by CDS notional amount as related to a fund's net assets (CDS/TNA) in columns (1)-(2) and (3)-(4), respectively. The analysis in column (2) is extended by applying the Heckman correction for sample selection based on maximum-likelihood estimation in column (5), for which the inverse of the Mill's ratio and the p-value of the Wald test are also reported; the results from the selection equation are similar to those reported in column (3) of **Table 3**. For the definitions of all variables, please refer to Appendix A. All regressions contain time fixed effects. Standard errors are clustered at the fund level. *,**,*** indicate significance at the 10, 5, and 1% level, respectively; t-statistics (in column (5) z-statistics) are provided in parentheses.

	(1) CDS/TNA	(2) CDS/TNA	(3) CDS/TNA	(4) CDS/TNA	(5) CDS/TNA
Big fund family (dummy)	0.0132	0.0035			0.0030
	(1.5500)	(0.4400)			(0.1200)
Fund TNA (ln)	0.0077*		0.0003		
	(1.7500)		(0.0300)		
Fund age (ln)	0.0059	0.0097	0.0508	0.1290*	0.0084
	(0.5000)	(0.6900)	(1.3200)	(1.7700)	(0.2900)
Institutional investments	0.0416**	0.0399*	0.0117	0.0191	0.0543
	(2.2900)	(1.9100)	(0.9000)	(0.9600)	(1.3200)
Investment grade (dummy)	-0.0189	-0.0281			-0.0977**
	(-1.2100)	(-1.4600)			(-2.1200)
Turnover ratio	0.0035	0.0070	-0.0051	-0.0027	0.0117
	(0.8600)	(1.4200)	(-0.9500)	(-0.4900)	(1.2800)
Expense ratio	0.0141	-0.0027	-0.0390	-0.0741	-0.0316
	(1.0000)	(-0.1500)	(-0.4500)	(-0.7700)	(-0.6200)
Past fund flow	-0.0703**	-0.0720**	-0.0510**	-0.0702***	-0.1030***
	(-2.4300)	(-2.4400)	(-2.3000)	(-2.7300)	(-2.6300)
Other derivatives (dummy)	0.0463***	0.0469***	0.0097	0.0129	0.0730***
	(2.8200)	(2.8000)	(0.9000)	(0.9700)	(2.8400)
Top20 U.S. university degree (dummy)		0.0090		0.0163	-0.0147
		(0.4800)		(0.8100)	(-0.5300)
Master degree (dummy)		0.0215		0.0209	0.0457
		(1.3800)		(0.8300)	(1.4000)

	(1) CDS/TNA	(2) CDS/TNA	(3) CDS/TNA	(4) CDS/TNA	(5) CDS/TNA
PhD degree (dummy)		0.0350		0.0391	0.0960
		(0.9900)		(1.2200)	(1.1200)
Assets under management (ln AUM)		-0.0003		-0.0222	-0.0032
		(-0.0600)		(-1.1700)	(-0.2200)
TNA/AUM		-0.0158		-0.0355	-0.0543
		(-0.7400)		(-0.8500)	(-1.1600)
Manager age		0.0006		0.0016	-0.0008
		(0.9100)		(1.2400)	(-0.5100)
Manager experience		0.0047		0.0086*	0.0225**
		(0.7900)		(1.7400)	(2.1900)
Team managed (dummy)		0.0148		0.0086	0.0200
		(0.9300)		(0.3500)	(0.5500)
Female (dummy)		-0.0301*		-0.0189	-0.1010**
		(-1.8300)		(-1.3900)	(-2.1400)
Constant	-0.1180**	-0.1110	-0.1100	-0.1850	-0.0185
	(-2.1700)	(-1.3100)	(-0.7400)	(-0.9100)	(-0.0900)
Observations	**2235**	**1957**	**2235**	**1957**	**2119/883**
R-squared	**0.1480**	**0.1860**	**0.0980**	**0.1380**	
Adjusted R-squared	**0.1360**	**0.1680**	**0.0850**	**0.1200**	
Fund fixed effects	**No**	**No**	**Yes**	**Yes**	
Inverse Mill's ratio (standard errors)					**-0.02878 (0.0153)**
Wald test (p-value)					**0.0314**

Table 5: Determinants of the Decision to Stay Net Short in CDS

This table reports the marginal effects of determinants of a fund's decision to stay net short in CDS (CDS net short) or not, conditional on CDS use in a particular period, from logit regressions. Columns (1)-(2) present the results including the turnover ratio, while columns (3)-(4) include the adjusted turnover ratio. The analysis in column (2) is extended by applying the Heckman correction for sample selection (maximum-likelihood probit model) in column (5), for which the p-value of the Wald test are also reported; the results from the selection equation are similar to those reported in column (3) of **Table 3**. For the definitions of all variables please refer to Appendix A. All regressions contain time fixed effects. Standard errors are clustered at the fund level. In column (5), the pseudo R-squared is determined based on the Chi-square test statistics as suggested by Aldrich and Nelson (1984). *,**,*** indicate significance at the 10, 5, and 1% level, respectively; z-scores are provided in parentheses.

	(1)	(2)	(3)	(4)	(5)
	CDS net short	**CDS net short**	**CDS net short**	**CDS net short**	**CDS net short**
Big fund family (dummy)	0.3250***	0.3560***	0.3220***	0.3810***	0.1510
	(4.1200)	(6.6500)	(3.8500)	(5.9700)	(1.5700)
Fund TNA (ln)	0.0207		0.0305		
	(0.6500)		(0.9600)		
Fund age (ln)	0.0644	0.1560**	-0.0119	0.0953	0.0586
	(0.6800)	(2.2300)	(-0.1000)	(1.1800)	(0.9100)
Institutional investments	0.0517	-0.0048	0.0800	-0.0391	-0.0371
	(0.4200)	(-0.0400)	(0.6200)	(-0.3200)	(-0.5300)
Investment grade (dummy)	-0.2020**	-0.2400***	-0.2570**	-0.3080***	-0.1740***
	(-2.0900)	(-2.7300)	(-2.3900)	(-3.3400)	(-2.7000)
Turnover ratio	0.0134	0.0062			-0.0029
	(0.6900)	(0.3500)			(-0.2400)
Adj. turnover ratio			0.0171	0.0155	
			(0.7600)	(0.9500)	
Expense ratio	-0.2670	-0.1730	-0.2020	-0.1610	-0.1200
	(-1.6300)	(-0.9400)	(-1.1700)	(-0.8500)	(-1.0400)
Past fund flow	0.1310	0.0976	0.0479	0.0687	0.0679
	(0.8000)	(0.9500)	(0.3600)	(0.8200)	(0.8000)
Other derivatives (dummy)	-0.0717	-0.1360**	-0.1060	-0.1670**	-0.1530***
	(-0.9200)	(-2.1800)	(-1.0700)	(-2.1600)	(-3.6000)

	(1)	(2)	(3)	(4)	(5)
	CDS net short	**CDS net short**	**CDS net short**	**CDS net short**	**CDS net short**
Top20 U.S. university degree (dummy)		-0.1260**		-0.1630***	-0.0749*
		(-2.4700)		(-3.0500)	(-1.9100)
Master degree (dummy)		0.0813		0.0979	0.0524
		(0.9700)		(1.2100)	(1.0800)
PhD degree (dummy)		0.1860*		0.2130**	0.1140
		(1.7900)		(2.1100)	(1.4300)
Assets under management (ln AUM)		0.0615**		0.0679**	0.0376**
		(2.0100)		(2.2400)	(1.9700)
TNA/AUM		-0.2660**		-0.1930	-0.1730*
		(-2.1700)		(-1.5100)	(-1.9400)
Manager age		0.0102**		0.0132**	0.0063*
		(2.0000)		(2.3100)	(1.6700)
Manager experience		0.0731***		0.0683**	0.0467**
		(2.7300)		(2.5700)	(2.2300)
Team managed (dummy)		-0.0639		0.0217	-0.0405
		(-0.7000)		(0.2300)	(-0.7500)
Female (dummy)		-0.0973		-0.1170	-0.0502
		(-1.0300)		(-1.1500)	(-0.7200)
Observations	**999**	**883**	**844**	**743**	**1957/883**
Pseudo R-squared	**0.1047**	**0.2746**	**0.1150**	**0.3080**	**0.3184**
Wald test (p-value)					**0.0000**

Table 6: Determinants of the Extent of Use of Net CDS

This table reports the results of OLS regressions either excluding or including fund fixed effects of various determinants of a fund's extent of net CDS use, as measured by CDS net notional amount in relation to a fund's net assets (CDS net/TNA) for funds that used CDS in a particular period between 2004 and 2010 in columns (1)-(2) and (3)-(4), respectively. The analysis in column (2) is extended by applying the Heckman correction for sample selection based on maximum-likelihood estimation in column (5), for which the inverse of the Mill's ratio and the p-value of the Wald test are also reported; the results from the selection equation are similar to those reported in column (3) of **Table 3**. The CDS net notional is positive (negative) whenever funds are net long (net short). For the definitions of all variables, please refer to Appendix A. All regressions contain time fixed effects. Standard errors are clustered at the fund level. *,**,*** indicate significance at the 10, 5, and 1% level, respectively; t-statistics (in column (5) z-statistics) are provided in parentheses.

	(1)	**(2)**	**(3)**	**(4)**	**(5)**
	CDS net/TNA	**CDS net/TNA**	**CDS net/TNA**	**CDS net/TNA**	**CDS net/TNA**
Big fund family (dummy)	-0.0532***	-0.0551***			-0.0355*
	(-2.8100)	(-3.0200)			(-1.8000)
Fund TNA (ln)	-0.0107		-0.0115		
	(-1.5500)		(-0.58)		
Fund age (ln)	0.0244	-0.0006	-0.3230***	-0.6660***	0.0117
	(1.3900)	(-0.0300)	(-3.0800)	(-4.3600)	(0.5700)
Institutional investments	-0.0037	-0.0144	-0.0003	0.0532	-0.0033
	(-0.1600)	(-0.5700)	(-0.0100)	(1.0300)	(-0.1300)
Investment grade (dummy)	0.0492**	0.0662***			0.0742***
	(2.2500)	(2.8000)			(3.0300)
Turnover ratio	-0.0085*	-0.0098**	-0.0045	-0.0085**	-0.0081*
	(-1.7700)	(-2.0700)	(-1.0200)	(-2.3400)	(-1.7400)
Expense ratio	0.0078	0.0250	0.2040	0.3240	0.0267
	(0.3500)	(0.9600)	(1.2200)	(1.4600)	(0.9900)
Past fund flow	0.0076	0.0083	0.0157	0.0073	0.0055
	(0.2900)	(0.2800)	(0.5300)	(0.2000)	(0.1700)
Other derivatives (dummy)	-0.0071	-0.0098	-0.0154	-0.0194	0.0132
	(-0.4300)	(-0.5800)	(-0.6300)	(-0.7700)	(0.6500)
Top20 U.S. university degree (dummy)		0.0410**		0.0117	0.0403**
		(2.4000)		(0.6300)	(2.4900)

	(1)	(2)	(3)	(4)	(5)
	CDS net/TNA	**CDS net/TNA**	**CDS net/TNA**	**CDS net/TNA**	**CDS net/TNA**
Master degree (dummy)		-0.0410*		-0.0679*	-0.0419*
		(-1.7200)		(-1.7500)	(-1.7700)
PhD degree (dummy)		-0.1260		-0.1200*	-0.1320
		(-1.5200)		(-1.9500)	(-1.5800)
Assets under management (ln AUM)		-0.0086		0.0370	-0.0076
		(-1.1200)		(1.3800)	(-1.0200)
TNA/AUM		0.0397*		0.1150*	0.0444*
		(1.7500)		(1.8500)	(1.8900)
Manager age		-0.0005		0.0007	-0.0005
		(-0.5300)		(0.3000)	(-0.5200)
Manager experience		-0.0135**		-0.0269*	-0.0130**
		(-2.2100)		(-1.9300)	(-2.2200)
Team managed (dummy)		0.0118		0.0087	0.0142
		(0.4500)		(0.3300)	(0.5600)
Female (dummy)		0.0612		0.0651*	0.0629*
		(1.5700)		(1.7500)	(1.6800)
Constant	0.0487	0.1490	0.8660***	1.2640***	0.0144
	(0.6700)	(1.0600)	(2.6600)	(5.0900)	(0.1000)
Observations	**999**	**883**	**999**	**883**	**1957/883**
R-squared	**0.1120**	**0.2620**	**0.0930**	**0.2460**	
Adjusted R-squared	**0.0810**	**0.2260**	**0.0640**	**0.2110**	
Fund fixed effects	**No**	**No**	**Yes**	**Yes**	
Inverse Mill's ratio (standard errors)					**0.0442 (0.0232)**
Wald test (p-value)					**0.0294**

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