

The Use of Credit Default Swaps by U.S. Fixed-Income Mutual Funds

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JEL-Classification: G11, G15, G23

Keywords: Corporate bond fund, credit default swap, credit risk, fund performance, hedging, speculation, tournaments

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Abstract

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When it comes to bond funds, “there is value in the complexity.” (Bill Kohli, manager of Putnam Diversified Income Trust)¹

1 Introduction

The market for credit default swaps (CDS), the major credit derivative to date, has grown tremendously until 2007, surpassing the sizes of the U.S. stock market, the mortgage market, and the U.S. treasury market together.² Major end-users of CDS are banks, hedge funds and insurance companies, which use CDS to insure their fixed-income portfolios, provide credit protection to others, or to benefit from perceived market mispricings. Over the past few years, the use of CDS has caused significant losses at a number of banks, and even led to the collapse of the largest insurance company in the U.S.: AIG. Little is known, however, about the use of CDS by mutual funds. In fact, many investors may be unaware that the bond funds they are holding trade in CDS, exposing them to significant risks. For example, on Feb. 13, 2009, a class action suit was filed alleging that OppenheimerFunds, Inc. misled investors about the derivatives and leverage exposures of the Oppenheimer Champion Income Fund, which has lost 74% of its net asset value in 2008, partially due to its exposure to credit default swaps.³

The objective of this paper is to document the use of CDS in the mutual fund industry, so as to understand to what extent, why and how mutual funds are using these derivatives. In particular, our data allow us to differentiate between four CDS strategies: long versus short CDS, and single-name versus multi-name CDS.⁴ Furthermore, we examine how the use of CDS has

¹ Jeffrey R. Kosnett, May 20, 2008, With Bond Funds, Keep it Simple, Kiplinger.com.

² Between 2005 and 2007 the notional outstanding amount of credit default swaps increased fourfold, reaching more than \$58 trillion in December 2007. As a result of the financial crisis, notional values contracted somewhat throughout 2008, falling to \$42 trillion by December 2008 (BIS, 2009).

³ http://securities.stanford.edu/1042/OPCHX_02/

⁴ Single-name CDS are contracts on one reference entity, i.e., a particular bond while multi-name CDS are contracts written on a portfolio of bonds, or a CDS index.

impacted fund performance and risk characteristics in order to determine whether the use of CDS has been beneficial to fund investors on average. We study the use of credit default swaps since 2004, the first date since U.S. mutual funds were required to disclose their derivatives holdings twice a year by filing Form N-Q with the SEC. The period 2004 to 2008 is also of particular interest as it represents a period of at first slightly declining credit risk premia until early 2007, and subsequently strongly increasing credit risk premia until the end of 2008 (see Figure 1).

We find that among the largest 100 U.S. corporate bond funds the use of CDS has increased from about 20% of funds in 2004 to 60% of funds in 2008. The size of the CDS positions (measured by their notional values) is usually less than 10% of a fund's net asset value, but some funds exceed this level by a wide margin, especially during 2008.⁵

Among CDS users the most frequent strategy is to sell single-name CDS. However, multi-name CDS positions are on average twice as large as single-name positions. Comparing long and short positions, we find that funds are generally net sellers of single-name CDS. This implies that on average funds use single-name CDS to increase their credit exposures rather than to hedge credit risk. With respect to multi-name CDS, funds switch between being net sellers and net buyers. While buying credit protection can reduce a fund's overall credit risk exposure, the volatility in the multi-name CDS positions suggests that funds may be using CDS to actively take positions rather than to passively hedge credit risk.

⁵ The notional values of the CDS positions exceeded 50% of a fund's NAV for six funds in our sample: Intermediate Term Bond Fund (First American Investment Funds), Oppenheimer Champion Income Fund, Putnam Diversified Income Trust, Putnam Income Fund, Western Asset Core Bond Portfolio, and Western Asset Core Plus Bond Portfolio.

Funds that use CDS are more likely to belong to a larger fund family and exhibit higher asset turnovers. The first result is consistent with the fact that trading in the CDS market requires additional costly infrastructure, which only larger fund families, due to economies of scale, are willing to invest in. A higher asset turnover identifies more actively managed funds. Thus, the second result is consistent with the hypothesis that actively managed funds use CDS for trading purposes. The higher liquidity in the CDS market compared to the corporate bond market would make CDS the preferred instrument for trading purposes.

Funds that use CDS perform worse on average than funds that do not use CDS. CDS users have lower absolute and relative fund returns than CDS non-users. For example, the relative return differential between CDS users and CDS non-users is about 72 basis points p.a. between 2004 and 2008. CDS users have slightly higher return volatilities than CDS non-users, but the economic and statistical significance is weak.

We find that underperforming funds tend to increase their short (multi-name) CDS positions during the second half of a calendar year. These results are consistent with the tournament hypothesis by Brown, Harlow, and Starks (1996). According to this hypothesis funds that underperform increase risk in order to improve their relative performance rankings. Since CDS tend to be more liquid than many corporate bonds, shorting CDS would be the most cost-effective way to increase risk for corporate bond funds.

The increase in short multi-name CDS is also negatively correlated with credit spreads, i.e., when credit spreads increase funds' short multi-name CDS positions decline. This negative correlation would be consistent with a belief in mean-reversion in credit spreads, i.e., managers reduce their short CDS positions when they expect credit spreads to increase. However, we further find a negative correlation between changes in short multi-name CDS positions and future

credit spread changes. Funds increase their short CDS positions before credit risk premia fall, and decrease their short CDS positions before credit risk premia rise. This effect is present over the entire sample period 2004 – 2008. This implies that changes in funds' CDS positions has been unprofitable on average, and thus must have contributed to the poorer performance of CDS users.

The rest of the article is structured as follows. Section 2 reviews the related literature. Section 3 describes the data and the data sources. Section 4 contains our econometric analysis, and Section 5 concludes.

2 Literature

Our results contribute to several strands of the literature. First, to the best of our knowledge, our study is the first that examines the use of CDS by mutual funds. Several papers examine the use of CDS by banks. Mahieu and Xu (2007), and Minton, Stulz and Williamson (2009) analyze data from the Federal Reserve Bank of Chicago Bank Holding Company Database (BHC), which contains limited information about the use of credit derivatives by U.S. banks. For example, Minton, Stulz and Williamson show that in 2005, only 23 large banks out of 395 used credit derivatives, and that most of these derivatives positions were held for trading rather than for hedging purposes. The size of these positions is generally quite small: the net notional amount of credit derivatives used for hedging purposes is less than 2% of the value of banks' loan portfolios. The authors conclude that the use of credit derivatives is limited because banks are unable to use hedge accounting when hedging with credit derivatives. In addition, Ofwegen, Verschoor and Zwinkels (2010) analyze the relation between credit derivatives and the probability of default of the 20 largest European financial institutions. They find that the use of credit derivatives tends to increase default risk.

Several studies have examined the use of derivatives by mutual funds, but none has focused on credit default swaps in particular or specific derivatives strategies as we do. Koski and Pontiff (1999) survey equity mutual funds and find that the use of derivatives is positively correlated with asset turnover and membership in a fund family. These results are consistent with our findings with respect to the use of CDS. Our results, however, are in contrast to Johnson and Yu (2004), who find that the use of derivatives is negatively correlated with fund age, and positively correlated with fund size. Marin and Rangel (2006) also find that derivatives usage is positively correlated with fund size. In addition, funds that are part of a fund family, no load funds, and funds with higher management fees are *ceteris paribus* more likely to use derivatives. Deli and Varma (2002) and Almazan, Brown, Carlson, and Chapman (2004) investigate mutual funds' investment constraints. Deli and Varma (2002) find that funds with the highest transaction cost benefits are more likely to permit investments in derivatives. Furthermore, Almazan, Brown, Carlson, and Chapman (2004) show that constraints on derivatives are more common if boards contain a higher proportion of inside directors, if the portfolio manager is more experienced, if the fund is managed by a team rather than an individual, and if the fund does not belong to a large organizational complex. One advantage of focusing on the use of CDS is that the available data allows us to examine to purpose of derivatives strategies, i.e., we can distinguish between strategies that increase or decrease total fund risk. The prior literature has only examined the use and the extent of derivatives usage.⁶

Another related literature focuses on the strategies fund managers use to alter the performance and risk characteristics of their funds. Brown, Harlow, and Starks (1996) interpret

⁶ A notable exception is Aragon and Martin (2008). They analyze 250 hedge fund advisors' holdings in equity options. They find that advisors holding options are able to achieve lower fund return volatilities and higher Sharpe ratios.

the mutual fund industry as a tournament. The winners of this tournament, i.e., the best performing funds, receive the highest inflows of new money (see Sirri and Tufano, 1998). This benefits fund managers because some of their compensation is linked to the size of the fund and hence new fund inflows. Therefore, managers of underperforming funds have an incentive to increase their funds' risk levels in order to close the return gap with competitor funds. Consistent with this prediction, the authors find that growth-oriented U.S. mutual funds, which underperformed during the first half of a fiscal year, increase fund volatility in the second half of the fiscal year to a greater extent than overperforming funds.^{7,8} Hu, Kale, Pagani, and Subramanian (2009) argue that managers of underperforming funds face a higher risk of job termination than managers of overperforming funds. Underperforming managers therefore have an incentive to increase fund risk in order to increase the chance to exceed the termination threshold. Finally, Chevalier and Ellison (1997) find that younger funds are more likely to participate in the tournament game than older funds. We add to this strand of the literature by showing that underperforming corporate bond funds increase fund risk by increasing the size of their short multi-name CDS positions.

The above papers also examine how derivatives usage is associated with mutual fund performance. For example, Koski and Pontiff (1999) find that 21% of equity funds use derivatives, but there are no statistical differences in the risk and return characteristics between funds that use derivatives and those that do not. However, the impact of past performance on fund risk is significantly less for funds that use derivatives than for funds that do not. Almazan,

⁷ Sirri and Tufano (1998) show that net fund flows are more sensitive to performance differences of high return funds than of low return funds. Thus, fund managers of top performing funds benefit more from rank improvements than managers of poorly performing funds.

⁸ Chavalier and Ellison (1997) find similar results. Kempf and Ruenzi (2008) find evidence that U.S. equity mutual funds adjust the risk they take depending on the relative position within their fund family. In contrast, Chen and

Brown, Carlson, and Chapman (2004) also find no evidence that the permission to use derivatives correlates with equity fund returns. Johnson and Yu (2004) find that among Canadian domestic equity funds derivatives users have lower returns and higher risk than non-users. Among fixed-income funds, however, derivatives users have higher risk and higher return levels than non-users. Johnson and Yu do not explain why they observe these differences, however. Marin and Rangel (2006) provide a more negative picture for Spanish mutual funds. In their sample, 44% of fixed-income funds use derivatives. Funds that use derivatives slightly outperform non-users. In addition, these authors find evidence suggesting derivatives are used for speculation. All of these studies base their conclusions on univariate comparisons. Hence, they leave the question unanswered, whether derivatives usage impacts fund performance. In contrast, we examine whether fund managers appropriately adjust their CDS positions before credit risk premia change. We find that fund managers incorrectly anticipate future changes in credit spreads on average. Thus, their use of CDS must have negatively affected fund performance.

3 Data

Since 2004, U.S. mutual funds are required to disclose their derivatives holdings semi-annually on Form N-Q. We focus our analysis on the largest 100 U.S. corporate bond funds by net asset value that are included in the CRSP survivorship-free mutual fund data base as of the end of the second quarter of 2004, excluding money market funds, treasury funds, municipal funds, and mortgage funds. We focus on this segment of the mutual fund industry because we suspected the heaviest usage of CDS in this segment. In fact, during the first half of 2009, only one fund out of the largest 30 U.S. equity funds held a small CDS position. Furthermore, we select the largest

Pennacchi (2009) and Busse (2001) do not find that underperforming equity mutual funds tend to increase the standard deviation of returns.

100 bond funds to focus on the most relevant group of funds from an investor's and a regulator's point of view, and to keep the data collection of CDS positions, which have to be collected by hand, manageable.

The top 100 U.S. corporate bond funds make up 80.3% of the overall market capitalization of all U.S. corporate bond funds. We follow these 100 funds until the end of the observation period in December 2008 to avoid survivorship bias.⁹ For each fund we obtain information on fund name, fund family, manager names, fund advisor name, net asset value (NAV), turn-over rate, fund classes, shares held by retail and institutional investors, fund fees, and the inception date from the CRSP mutual fund data base.

Appendix A contains the names of the top 100 U.S. corporate bond funds as of the second quarter of 2004, the Lipper fund class for each fund, and the NAV. By far the largest fund is the Total Return Fund of the PIMCO fund family with a NAV of \$73 billion. The smallest fund is the Federated Strategic Income Fund by Federated Fixed Income Securities with a NAV of \$1 billion.

The most common Lipper fund classes among the top 100 funds are *high current yield funds* (32 funds) and *intermediate investment grade funds* (28 funds). *Corporate debt funds A-rated* and *investment grade, short-intermediate* feature 11 and 10 funds respectively. The remaining three fund classes, *short investment grade*, *corporate debt funds BBB-rated*, and *multi-sector income* consist of 6-7 funds each. Based on the correlation of fund returns between the Lipper fund classes we classify multi-sector income and high current yield funds as *high yield*, and all other funds as *investment grade*. The correlations of semi-annual fund returns within each

⁹ Two funds were discontinued and merged into other existing funds. Fidelity's Spartan Investment Grade Bond Fund was merged into the Investment Grade Bond Fund on July 28, 2006. The Oppenheimer High Yield Fund was merged into the Oppenheimer Champion Income Fund on Oct. 12, 2006.

of these two categories generally exceed 0.90. The correlations of fund returns between the two categories are usually well below 0.90.

For our performance analysis we obtain monthly fund returns from the CRSP mutual fund data base. We construct fund-based return benchmarks by calculating equally-weighted return indices of all funds in a particular Lipper fund class. For this exercise we use the universe of U.S. corporate bond funds, not just the largest 100 funds. These fund-based benchmarks allow us to determine the relative performance ranking of each of our 100 funds per fund category. Since funds may compare their performance not to a set of other bond funds, but to the returns of particular corporate bond classes, we also construct passive return benchmarks of corporate bonds that approximately reflect the asset allocation of our 100 funds. For this, we obtain Bank of America Merrill Lynch (BOFA ML) bond indices from Datastream that match the risk profile of each one of the seven Lipper fund classes that occur in our sample. If a reasonable match cannot be found, we construct a new index from two or three bond indices. The weighting scheme we use for this construction is based on Moody's credit rating distribution for U.S. corporate bonds during our observation period. See Appendix B for further details.

In order to identify which of the top 100 funds potentially holds CDS positions, we searched 1,161 N-Q (and 21 N-Q/A) forms, available from SEC's EDGAR database, for the following key words: *credit default*, *default swap*, *cds*, *default contract*, and *default protection*. We manually cross-check our search algorithm by randomly selecting 30 N-Q forms without any of the above key word hits. In none of these cases do we find CDS holdings. For funds with CDS holdings we manually collect for each CDS position the notional value, the reference asset, the expiration date of the swap, the counterparty, whether the swap was bought or sold, the swap

premium, and the unrealized gain or loss of the swap position.¹⁰ This step generated information on 14,906 CDS positions.

4 Results

In this section we examine how widespread the use of CDS is among the top U.S. corporate bond funds, why some funds use CDS while others do not, what CDS strategies mutual funds use, and also determine the impact of CDS usage on fund performance.

4.1 The Use of CDS by U.S. Corporate Bond Funds

In this section we describe the top 100 U.S. corporate bonds funds in terms of fund size and other fund characteristics. We also describe the size, type and direction of the CDS positions used by these funds, and how CDS strategies evolved over time. One objective is to determine whether fund managers use CDS to increase their fund's exposure to credit risk or to hedge credit risk of the existing bond positions.

Table 1 shows summary statistics for the top 100 bond funds. Not surprisingly, bond funds are large. The mean and median NAVs are \$5 billion and \$2 billion respectively. The dispersion in fund sizes is large and highly skewed. NAVs range from 264 million to over 130 billion. The reason why there appear to be a number of smaller funds under the top 100 is that

¹⁰ To ease the extraction process from the raw txt and html files, we download the N-Q forms again from EdgarOnline, a subscription-based website, which already transforms the fund holdings into standard rft and pdf formats. We find 289 different N-Q forms that include at least one of these key words. However, in many cases, the CIK number refers to a family of funds rather than to one specific top-100 fund. We thus search for the top-100 fund names and exclude those N-Q forms that do not cover our top-100 funds. Additionally, we analyze right-censoring in the CDS holding history because this occurrence might be due to i) a change in the fund name; ii) a close of the respective fund; iii) a merger with another fund. In the last two cases the fund history ends while in the first case we employ the fund history. Since some fund families, in particular large ones such as Fidelity with 12 funds, contribute more than one fund, we are left with 379 N-Q form-fund observations from 65 top-100 funds with CDS data.

some funds experienced significant value losses and redemptions during the financial crisis in 2008. Note that the smallest of the top 100 funds in 2004 had a NAV of \$1 billion.

The distributions of fund sizes of investment grade and high yield funds are roughly similar to the overall average, except that the ultra large funds, with NAVs above \$15 billion, all belong to the group of investment grade funds. This fact affects the sample means, so that the mean NAV of investment grade funds is about twice the mean of high yield funds, while the remaining percentiles (except for the maximum) are roughly similar. The largest high yield fund, the American High-Income Trust, had a NAV in 2004 of “only” \$8.9 billion.

The average fund age (since inception) among the top 100 bond funds is 20 years, ranging from as little as four years to 73 years. About 75% of the top 100 funds belong to a larger fund family, i.e., a fund family that has at least two funds among the top 100 corporate bond funds in its portfolio.¹¹ These figures are similar for investment grade and high yield bonds. In contrast, however, there is a larger proportion of institutional investors among investment grade funds. On average, 44% of the NAV of investment grade funds is held by institutions, while institutions hold only 16% of the NAV of high yield funds.

The total expense ratios of the top 100 funds range from 0.13% to 1.75%.¹² There are nine index funds in our sample, which feature average total expense ratios of less than 0.25%. The total expense ratios of investment grade funds average about 0.61%, while the total expense ratios of high yield funds are almost double and average at 1.06%. The asset turnovers also appear to differ significantly between investment grade and high yield funds. The turnover ratio of investment grade funds is with 1.79 more than twice the turnover ratio of high yield funds.

¹¹ This definition of a large fund family follows Koski and Pontiff (1999).

¹² Expense ratio, turnover ratio, and the fraction of retail investors are value weighted averages over the outstanding fund classes.

Finally and somewhat surprisingly, we find that 50% of investment grade funds use CDS, while only 27% of high yield funds use CDS.

Table 2, Panel A shows how funds' NAVs and their CDS positions have evolved over time. While the mean NAV increased from \$4.2 billion in 2004 to \$5.7 billion in 2008, the median NAV remained roughly constant at \$2 billion. This implies that only a minority of funds were able to grow their asset values.

The number of funds that held CDS positions increased from 21 in 2004 to 60 in 2008. In total there are 65 funds that used CDS sometime between 2004 and 2008, while 35 funds never used CDS. Among the 65 CDS-using funds, 17 funds held CDS positions throughout our sample period. The frequency of using CDS among corporate bond funds is comparable with Chen (2009), who finds that 71% of a large sample of hedge funds uses derivatives.

Among funds that used CDS, the total notional value of CDS positions increased from an average of \$103 million per fund in 2004 to an average of \$632 million per fund in 2008. The mean total notional value relative to a fund's NAV increased from 2% to almost 14%. The most significant increases in the size of CDS positions took place in 2007 and 2008. While most funds appear to maintain modest CDS positions, some funds carried very large CDS positions relative to their NAVs as shown by the maximum values, which range from 15% to almost 70% in 2007. In 2008, the notional values of the CDS positions of three funds even exceeded those funds' NAVs. For example, the Oppenheimer Champion Income Fund had a NAV of \$2.4 billion at the end of 2007, and CDS positions with a total notional value of \$1.5 billion (62% of NAV). During 2008, the fund lost 74% of its value. While the size of the derivatives position was reduced nominally, it increased to 101% of NAV.

Judging from the reported book values of outstanding CDS positions (see Table 2, Panel B) the potential impact of CDS on a fund's NAV appears to be small. On average, the reported book losses are less than 1% of a fund's NAV. However, by the end of 2008, one fund reported a book loss equal to 18.7% of its NAV due to its CDS positions alone. Furthermore, the semi-annually reported CDS positions provide only a partial picture of a fund's complete CDS activities. Many CDS trades may have occurred between reporting dates. Thus, the extent of a fund's CDS exposure may be significantly larger than what is implied by the reported book values.

Next, we analyze the types and direction of CDS positions taken by the top 100 bond funds. We distinguish between four general strategies. Funds can buy or sell CDS, and these CDS can be written on a single reference asset such as a corporate bond (single-name CDS), or on a portfolio of bonds, or a CDS index (multi-name CDS).¹³ When funds buy CDS they buy credit protection, and thus reduce their credit exposure if the reference asset is part of the fund's holdings. When they sell CDS they sell credit protection, which increases the fund's credit exposure. For example, single-name CDS can be used to create a synthetic corporate bond, which may provide better returns than the actual bond investment due to the higher liquidity in the CDS market. To create a synthetic corporate bond a fund would sell a single-name CDS and invest the notional value in a risk-free security. Another CDS strategy is known as a negative basis trade. In this case a fund purchases a corporate bond and purchases a CDS on the same bond. Such trade would yield a positive cash flow if the spread of the bond is higher than the spread of the CDS (negative basis) and the swap counterparty does not default. Of course, a negative basis trade is subject to counterparty and liquidity risk, which may partially explain the lower CDS spread.

This example shows how using CDS can expose mutual fund investors to new, possibly unexpected risks.

Multi-name strategies can be used to increase (decrease) a fund's credit risk exposure by selling (buying) CDS on a reference asset, which mimicks the fund's general asset allocation. If the reference asset does not correspond to some of the fund's other assets, then selling CDS could help diversify the fund. The high liquidity of multi-name CDS also makes them preferred speculative instruments to take a view on the future development of credit spreads. Thus, if a fund manager wishes to time the market we would expect him to do so using multi-name rather than single-name CDS.

Table 3, Panel A provides descriptive statistics of each CDS strategy. The most frequent strategy is single-name short, used by 79% of CDS users. Single-name long and multi-name short are used by about 50% of CDS users, and multi-name long strategies are used by only 35% of CDS users.

Table 3, Panel B shows the average notional amounts of CDS scaled by NAV per fund for each of the four strategies and how these averages evolved over time. Multi-name CDS positions are generally larger than single-name positions. Over the entire sample period multi-name CDS positions (both short and long) are about 4-5% of a fund's NAV, while single-name CDS positions are about 2-3% of a fund's NAV. The sizes of all four CDS strategies fluctuate significantly over time. The average multi-name long position ranges from 2-7%, while average multi-name short position ranges from 1-9%. Single-name long positions range from 1-4%, while

¹³ CDS positions are defined as multi-name if the reference asset of a CDS position includes at least one of the following key words: ABX, CDX, iBoxx, iTraxx, CMBS, CMBX, Trust, backed.

single-name short positions range from 1-5%. Thus, multi-name strategies are somewhat more volatile than single-name strategies.

The higher volatility of multi-name strategies also becomes apparent if long and short CDS positions are netted at the fund level. The average multi-name net position switches back and forth between being net long and net short, while the average single-name net position is almost always net short. This volatility suggests that multi-name CDS may be used for position taking rather than hedging considerations, and thus dependent on the manager's view about the future development of the overall credit risk premium. Interestingly, the CDS users among the top 100 funds were net short in both multi- and single-name CDS during the financial crisis, which started in the second half of 2007. This was the wrong period to be net short in credit markets, and has resulted in serious losses at some funds. We will examine the impact of CDS in more detail in Section 4.3.

Figure 2 shows histograms of the multi- and single-name CDS net positions scaled by NAV. Note that the horizontal axis displays the lower interval limits of each observation bucket, i.e., the "0.00" bucket contains the observations from the interval $[0, 0.02)$. The two histograms confirm that for both single- and multi-name CDS, net short positions are more common than net long positions (all means and medians are negative). However, there clearly are large dispersions in the net CDS positions among the top 100 funds. Some have significant net short positions while others have significant net long positions even exceeding a fund's NAV.

Do fund managers consider the four CDS strategies separately, or are long and short CDS positions interrelated? For example, do mutual fund managers employ strategies in which they take a view on credit spread differences? In this case we would expect to observe long and short CDS positions of equal magnitude simultaneously. To answer this question we graph the notional

value of CDS positions against the net notional value in Figure 3. If funds speculated on credit spread differences we would expect large notional values while the net notional values should be close to zero. The scatter plots in Figure 3 show that this is rarely the case. When the net notional values are zero, the notional amounts tend to be small as well.

To summarize, by 2008, the top 100 U.S. corporate bond funds were as likely to hold CDS positions as hedge funds were to hold derivatives. Bond funds use CDS predominantly to increase a fund's exposure to credit risk rather than to hedge credit risk. While some single-name short CDS positions can be rationalized by synthetic bond investments, the volatility in multi-name CDS positions suggests managers may be timing credit markets.

4.2 The Determinants of CDS Strategies

In the next step we examine which funds / fund managers are more likely to use CDS, and the motives behind the four CDS strategies. As the prior literature on mutual funds has shown, some fund managers may have incentives to improve fund performance by increasing fund risk, while others have incentives to reduce (hedge) risk. In particular, a fund's past performance has been associated with the willingness of a manager to take on additional risk.

We first estimate logit models based on all 100 funds in our sample to determine the determinants of CDS usage. The prior literature has shown that the use of derivatives by mutual funds is related to fund size, asset turnover, membership in a fund family, fund age, and fund expenses. We follow this literature and use all of these variables as regressors. We also control our regressions for the fraction of a fund's NAV held by retail investors because institutional investors may influence a fund manager regarding CDS usage, while it is unlikely that such pressure would come from retail investors. In addition, we distinguish between investment grade

and high yield funds, and include dummy variables for each time period to control for common time effects.

Table 4 reports the marginal effects from pooled logit models (Columns I and II), and marginal effects from fund level random effects logit models (Columns III and IV). In Columns V and VI we report standard coefficients from conditional fund-fixed-effects logit models. Due to the inclusion of fund-fixed-effects, only funds that began or stopped using CDS during our sample period remain in the sample. Consistent with Koski and Pontiff (1999), we find that the use of CDS is positively correlated with membership in a larger fund family, asset turnover, and fund age. If a fund belongs to a large fund family it is about 30% more likely to use CDS than funds that do not belong to a large fund family. This is understandable as trading in CDS requires additional infrastructure and thus causes additional costs. If these costs can be shared across several funds, the cost per fund decreases, so that the investment in the CDS infrastructure is more economical.

An increase in the asset turnover ratio by one standard deviation increases the likelihood to use CDS by 9-14%. Furthermore, the results in Columns V and VI show that asset turnover ratios increased on average following the adoption of CDS strategies. Asset turnovers can proxy for how actively a fund is managed. The positive correlation between asset turnover and CDS usage suggests that CDS are useful tools for active fund managers, which would be consistent with our earlier findings that CDS are used to take risks rather than to passively hedge risks. These results are robust even after excluding the second half of 2008, which was characterized by unprecedented market dislocations.

We also find that older funds are significantly more likely to use CDS than younger funds. When restricting the sample to funds that started or stopped using CDS (Columns V and VI) fund

age is, not surprisingly, no longer significant, since fund age does not change much for an individual fund. For the same subsample, we find that total expense ratios decline after the adoption of CDS strategies. Finally, institutional investors appear to have some impact on a fund's likelihood to use CDS, but only in the second half of 2008.

Next, we examine whether some of the CDS strategies are motivated by a desire to increase total fund risk following poor past performance. As discussed in Section 2, Brown, Harlow, and Starks (1996) argue that managers of underperforming funds have incentives to increase risk in order to improve their relative performance ranking. In fact, the class action suit mentioned previously alleges that the Oppenheimer Champion Income Fund "altered its investment style and began to significantly increase its risk in the hopes of seeking higher returns, including by dramatically increasing its use of derivative instruments." Applying this idea to the use of credit default swaps, we expect that funds with below average performance subsequently increase their CDS short positions and decrease their CDS long positions. In addition to just increasing risk, fund managers could also take directional positions and time credit markets, e.g., buy credit protection when they expect credit spreads to increase and sell credit protection when they expect credit spreads to decrease. Unfortunately, the expectations of individual managers are unobservable. We use current credit spread changes as an inverse proxy for the market's expectation about future credit spreads based on the assumption that credit spreads are mean-reverting.¹⁴ Since we observe more volatility in multi-name CDS positions, we expect that multi-name CDS respond more to credit spread changes than single-name CDS.

In order to test these hypotheses we estimate the following fixed-effects model for each of the four CDS strategies.

¹⁴ Mean-reversion in credit markets has been documented by Bhanot (2005) for example.

$$\Delta \frac{CDS \text{ notional amount}_{it}}{NAV_{it}} = \alpha_i + \beta_1 Performance_{it-1} + \beta_2 \Delta Credit \text{ spread}_t + e_{it} \quad (1)$$

We use two variables to measure the past performance of a fund. The first measure is defined as the difference between a fund's total return and the return of our fund-based benchmark. The second measure is defined as the difference between a fund's total return and the return of the passive benchmark. Since short CDS positions are negative we expect a positive coefficient on past performance ($\beta_1 > 0$). The credit spread is measured by the difference between the average yield on Baa-rated corporate debt and 10-year U.S. Treasury securities. If managers believe in mean-reversion then we would expect a negative coefficient ($\beta_2 < 0$). We control for cross-sectional variation in fund characteristics by including fund-fixed-effects.

Table 5 reports the estimation results of equation (1) using a Heckman selection model. In the first stage we model the decision to use CDS as in Table 4. The main selection variables are the big fund family dummy, fund age, and the turnover ratio. Since the first stage results are similar to the results reported in Table 4, we omit them in Table 5. In the second stage, we use past performance and changes in credit spreads as the only regressors because the regressors of the first stage are relatively stable over time and do not explain changes in any of the four CDS strategies. In Panel A we examine multi-name CDS strategies, while in Panel B we examine single-name CDS strategies. The results show that changes in short, multi-name CDS positions are significantly correlated with past performance. A decrease in the relative performance by 50 bp increases the size of the short, multi-name CDS positions by 0.5-1.0 % (relative to NAV). Given that short, multi-name positions average at about 4% of NAV, this is an economically large increase. Thus, fund managers appear to use multi-name CDS to increase fund risk following poor performance.

In addition we find that changes in the short, multi-name CDS positions are negatively correlated with contemporaneous changes in credit spreads. If the credit spread increases by 50 bp, then the short position increases by around 2% of NAV. If the effect is causal, then such strategy would be sensible if fund managers believed in mean-reversion, and use the increased spread as an opportunity to speculate on falling spreads in the future.¹⁵

Interestingly, we find evidence of risk-increasing strategies and directional views only among short, multi-name CDS positions, but not among any of the other three CDS strategies. This suggests that the determinants of these strategies follow different rationales. For example, it could be that single-name CDS strategies are mostly motivated by the creation of synthetic bond positions or negative basis trades. In this case it would not be surprising that single-name positions do not correlate with fund performance. Rather they should correlate with particular market conditions. Similarly, long multi-name CDS may be motivated purely by hedging considerations. It will be part of our future research to examine these possibilities in more detail.

To summarize, we find that funds that underperform subsequently increase their short multi-name CDS positions, which should tend to increase total fund risk. Furthermore, we find evidence of market timing only among short multi-name CDS strategies. These findings are consistent with the fund tournament hypothesis by Brown, Harlow, and Starks (1996), and to our knowledge the first time that evidence for fund tournaments has been found for corporate bond funds.

¹⁵ Results remain qualitatively unchanged if we use a seemingly unrelated regression (SUR) model to account for the simultaneity of the four different CDS strategies.

4.3 The Impact of CDS Usage on Fund Performance

In this last section we examine the impact of CDS usage on a fund's performance and risk characteristics. Depending on whether CDS are used for position-taking (speculating) or hedging objectives on average, total fund risk could either increase or decrease. If managers have no private information with respect to a firm's credit risk or overall credit risk premia, expected fund performance should not be affected. If managers have market timing ability, however, then we would expect higher returns for funds that use CDS for position-taking. For example, Kosowski, Timmermann, Wermers, and White (2006) provide evidence that a sizable minority of managers pick stocks well enough to more than cover the additional costs of stock-picking. In addition, the authors find that these managers persistently outperform their peers.

In a first step, we characterize the top 100 bond funds in terms of their average returns and standard deviation of returns. We consider both absolute and relative returns, as well as fund alphas. We estimate constant and time-varying alphas. Time-varying alphas are estimated following Huij and Derwall (2008) by a smoothed Kalman filter using a bond market, a high-yield and a mortgage securities factor.¹⁶

Panel A of Table 6 shows descriptive statistics. Between 2004 and 2008 the top 100 bond funds yielded semi-annual returns of 1% on average, ranging from -24% to +8%. On average, the top 100 bond funds underperformed other corporate bond funds by 0.24% p.a., and underperformed comparable corporate bonds by 0.48% p.a. The variability in the relative performance is high, which ranges from -30% to +16% p.a.

¹⁶ Refer to Kim and Nelson (2000) for a general overview and Kim et al. (2001) for an appearance in the finance literature.

Panel B of Table 6 shows that among the top 100 funds CDS users underperform non-users by 3.7% p.a. This difference in absolute returns is economically very large, and caused by a number of factors. During the second half of 2008, CDS strategies performed especially poorly. If we exclude the second half of 2008 from the analysis the difference in returns between CDS users and non-users declines to 1.2% p.a. (not reported). In terms of relative performance, CDS users also performed worse than CDS non-users, by about 0.7-0.8% p.a. The two alpha measures confirm these results. CDS users have significantly lower alphas than non-users. These differences are smaller but remain highly significant if we exclude the second half of 2008 (not reported). Interestingly, we observe no significant return differences between funds that were net short or net long CDS.

Since the univariate analysis in Table 6 does not control for other factors that may also affect performance, we perform a multivariate analysis of funds' absolute and relative returns in Table 7. Here we regress fund returns and alphas on the CDS user dummy variable and fund characteristics, such as fund size, asset turnover, fund age, association with a larger fund family, the fraction of the fund held by retail investors, and whether a fund is an investment grade or high yield fund. We control for common time effects by including semi-annual time dummies.

The multivariate analysis confirms that CDS users have significantly lower returns than CDS non-users. The absolute return difference is 72 bp p.a. The relative return differences are 40-54 bp p.a.¹⁷ CDS users also appear to have lower alphas than non-users. In addition, we find that larger funds and investment grade funds have higher absolute and relative returns as well as higher alphas.

¹⁷ Returns are calculated net of fund fees. Our results remain if we use gross fund returns instead (not reported).

Next, we examine the standard deviations of returns of CDS users and non-users. The univariate analysis in Table 6, Panel B shows that CDS users have higher standard deviations of both absolute and relative returns than CDS users. These differences seem to be driven by those funds that were net short in CDS, while the funds that were net long display return volatilities that were similar to the return volatilities of CDS non-users. This finding is consistent with the view that short CDS positions are used to increase a fund's total risk exposure.

In Table 8 we check whether these results hold up in a multivariate analysis. We regress the standard deviation of both absolute and relative returns on the CDS user dummy variable and several control variables that may be correlated with fund risk. In all regressions we find that CDS users display higher standard deviations of returns than CDS non-users. However, the coefficient is statistically significant in the last regression only. Older funds and investment grade funds have lower volatilities than younger and high yield funds. Surprisingly, funds with higher asset turnovers have lower return volatilities than funds with lower asset turnovers, but the economic magnitude of the coefficient is small.

Overall, we find that CDS users have significantly lower returns than non-users on average, while having the same or even higher standard deviations of returns than CDS non-users. These differences persist even after controlling for time effects. The underperformance is somewhat less severe if fund alphas are considered.

The underperformance of CDS users can have several explanations. Funds that underperform may be more likely to use CDS hoping to improve performance. Our evidence presented in Table 5 supports this possibility. Alternatively funds' CDS strategies may generate losses that negatively impact performance. In order to judge whether the use of CDS has been beneficial to fund investors, we now focus on the second possibility. A challenge is the relatively

short sample period (due to data availability), and the possibility that the poor performance of short CDS positions during the financial crisis is due to bad luck. We therefore focus on a partial aspect of the impact of CDS strategies on fund performance.

In Table 3 we observed that the average net multi-name CDS position fluctuated significantly between net short and net long over time. In Table 5 we report that short multi-name CDS positions are correlated with contemporaneous credit spread changes, which suggests that some fund managers are timing the credit market using multi-name CDS. We therefore aim at evaluating the success of market timing by examining how CDS positions changed before credit risk premia changed. For example, if funds increased their short positions before credit risk premia rose, then this would undoubtedly reduce fund performance.

To examine this possibility we follow the approach by Brown, Crabb, and Haushalter (2006) and regress changes in the sizes of each of the four CDS strategies on future credit spread changes.

$$\Delta \frac{CDS \text{ notional amount}_{it}}{NAV_{it}} = \alpha_i + \beta \Delta Credit \text{ spread}_{t+1} + e_{it}$$

We measure the credit spread by the yield difference between Baa-rated corporate bonds and 10-year U.S. Treasury securities.¹⁸ We estimate a fixed-effects model to control for unobservable fund fixed effects. The results show that on average funds decrease their short multi-name CDS positions before the credit spread rises. The effect prevails even if we exclude the second half of 2008. Such strategy clearly yields losses, and at least partially explains why CDS users generally underperform non-users. This result is consistent with Huang, Sialm, and Zhang (2009), who find that funds that increase risk perform worse than funds that keep stable risk levels over time.

¹⁸ We have also used the Aaa spread instead, without any material changes in the results. The Baa and Aaa spreads are highly correlated ($\rho=0.97$) during our sample period.

Interestingly, we find no significant correlations between the other three CDS strategies and future credit spread changes. This is consistent with our earlier conclusion that these strategies follow other determinants, and firms primarily use short multi-name CDS to time credit markets. Unfortunately, they do not seem to be successful at this on average.

5 Conclusion

In this paper we analyze the use of credit default swaps by the top 100 U.S. corporate bond funds between 2004 and 2008. We find that the use of CDS has increased from about 20% of funds in 2004 to 60% of funds in 2008. Thus, by now the frequency of CDS usage among the largest bond mutual funds is comparable to the frequency of derivatives usage by hedge funds. The size of CDS positions (measured by the notional value) is usually less than 10% of a fund's net asset value, but some funds exceed this level by a wide margin, especially during the financial crisis in 2008.

Funds are generally net sellers of single-name CDS, which shows that managers use CDS to take risk rather than to hedge risk. They switch between being net sellers and net buyers of multi-name CDS. This volatility suggests that some fund managers use multi-name CDS to time credit markets rather than to hedge credit risk. Consistent with this possibility, we find that funds increase their short (multi-name) CDS positions when credit risk premia rise. Such strategy may stem from a belief in mean-reversion of credit spreads.

In fact, it is the underperforming funds that tend to increase fund risk by increasing their short, multi-name CDS positions. This result is consistent with the tournament hypothesis advanced by Brown, Harlow, and Starks (1996), which states that underperforming funds increase fund risk to try to improve their relative performance. CDS would be the instrument of choice due to the higher liquidity in CDS markets relative to corporate bond markets. To our

knowledge this is the first time evidence in favor of fund tournaments among corporate bond funds has been established.

Finally, we examine the performance of funds' CDS strategies. Generally, funds that use CDS exhibit lower returns and the same or slightly higher standard deviations than funds that do not use CDS. This result holds before and during the financial crisis. Part of the reason for this underperformance is that on average funds increase their short (multi-name) CDS positions before credit spreads rise and decrease their short (multi-name) CDS positions before credit spreads fall. This poor market timing must have contributed to the general underperformance of CDS users.

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Figure 1: Credit Spreads

This figure shows the evolution of the spreads between the average yield on Aaa-rated (Baa-rated) corporate debt and 10-year U.S. Treasury securities between July 2004 and December 2008.

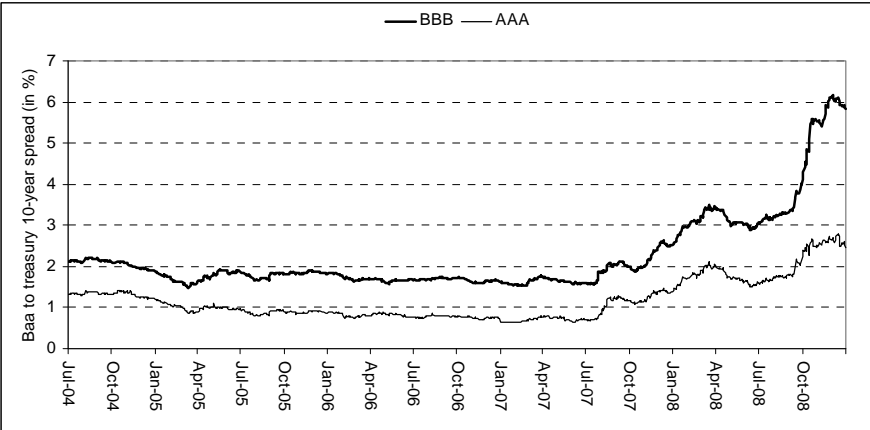


Figure 2: The Distribution of Net Notional Values of CDS Positions

These figures show the distribution of the net notional amounts (protection bought – protection sold) of multi-name and single-name CDS scaled by a fund’s net asset values (NAV). The sample is comprised of the largest (by NAV) 100 U.S. mutual corporate bond funds as of the end of the second quarter of 2004 as reported by the CRSP survivorship-free mutual fund data base. The reporting period is semi-annual, 2004 – 2008. Each fund in the sample is classified into one the following Lipper fund classes: Corporate Debt Funds (A-Rated), Corporate Debt Funds (BBB-Rated), Intermediate Investment Grade Debt Funds, Short Investment Grade Debt Funds, Short-Intermediate Investment Grade Debt Funds, Multi-Sector Income Funds, and High Current Yield Funds. The horizontal axis displays the lower interval limits of each observation bucket, i.e., the “0.00” bucket contains the observations from the interval [0, 0.02) and thus contains zero and positive net notional values.

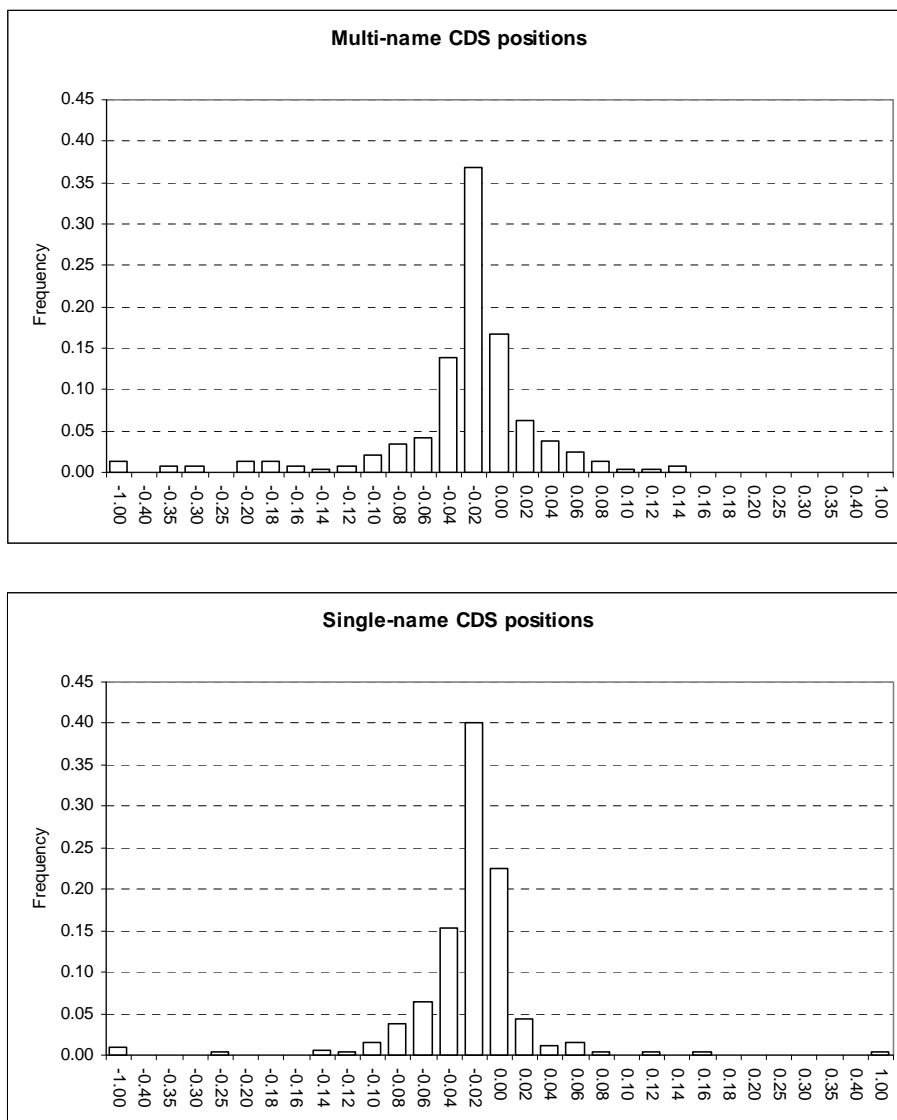


Figure 3: Notional Amounts versus Net Notional Amounts

These figures show the relationship between the sum of net notional amounts (protection bought – protection sold) and the sum of the notional amounts of CDS positions for each of the top 100 U.S. mutual corporate bond funds between 2004 and 2008 (see Figure 1 for further descriptions of the sample). The upper figure refers to only multi-name CDS positions, while the lower figure refers to only single-name CDS positions. The straight lines denote points for which the notional amounts equal the net notional amounts, i.e., funds hold either long or short CDS positions, but not both. All interior points refer to cases in which funds held both long and short CDS positions. A small number of outliers is omitted from these graphs to facilitate a meaningful comparison. Axes refer to \$ millions.

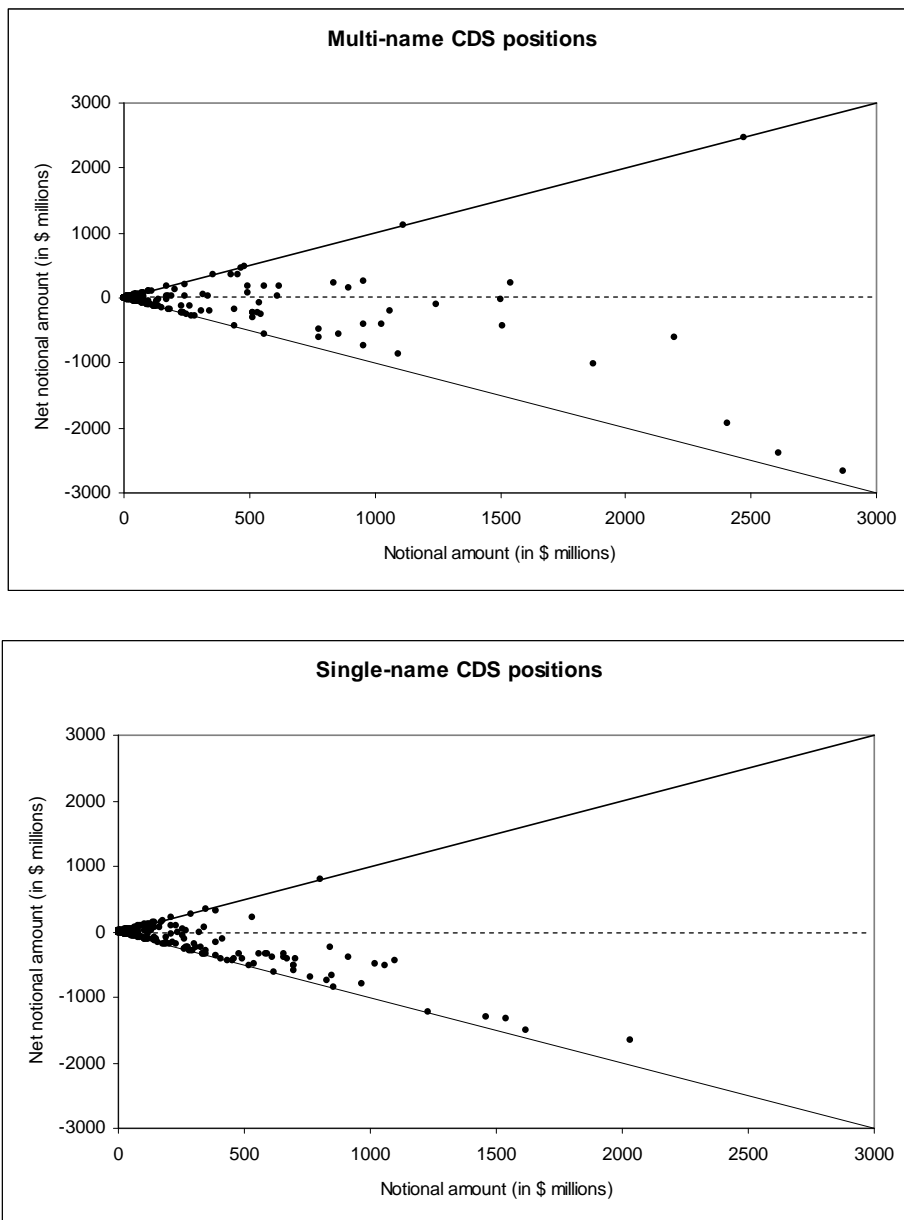


Table 1: Fund Characteristics

This table shows fund characteristics of the top 100 U.S. mutual corporate bond funds between 2004 and 2008. The top 100 funds are defined as the largest 100 corporate bond funds (by net asset value) as of the end of the second quarter of 2004 and included in the CRSP survivorship-free mutual fund data base. Each fund is classified to one of the following Lipper fund classes: Corporate Debt Funds (A-Rated), Corporate Debt Funds (BBB-Rated), Intermediate Investment Grade Debt Funds, Short Investment Grade Debt Funds, Short-Intermediate Investment Grade Debt Funds, Multi-Sector Income Funds, and High Current Yield Funds. Funds in the last two fund classes are classified as high yield funds. Otherwise, we refer to funds as investment grade funds. *Asset turnover ratio* is defined as annual asset sales / NAV. *Fund age* measures the number of years since a fund's inception. *Big fund family* is a dummy variable that equals 1 if the associated fund family consists of more than one fund in our sample and 0 otherwise. *Total expense ratio* is the sum of the fund's operating expenses which include 12b-1 fees over a fund's total NAV. It may include waivers and reimbursements. *Fraction of retail investors* is the proportion of a fund's total NAV held by retail investors (net asset value of retail investor fund classes / total NAV). *CDS usage* is a dummy variable if a fund uses CDS and zero otherwise. All data are taken from the CRPS survivorship free mutual fund data base.

Variable	N	Mean	Std. dev.	Min	25%ile	Median	75%ile	Max
<i>Panel A: All funds</i>								
Total NAV (in \$ millions)	890	5,040	11,502	264	1,274	2,155	5,061	130,930
Fund age (years)	890	20.9	10.3	4.0	13.0	19.0	28.0	73.0
Big fund family	890	0.75	0.43	0	0	1	1	1
Fraction of retail investors	890	0.66	0.40	0.00	0.19	0.91	1.00	1.00
Asset turnover ratio (%)	890	1.36	1.42	0.00	0.48	0.81	1.74	10.81
Total expense ratio (%)	890	0.78	0.35	0.13	0.55	0.75	1.07	1.75
CDS usage	890	0.41	0.49	0.00	0.00	0.00	1	1
<i>Panel B: Investment grade funds</i>								
Total NAV (in \$ millions)	544	6,309	14,415	264	1,385	2,374	5,399	130,930
Fund age (years)	544	20.5	9.1	6.0	14.0	18.0	26.0	54.0
Big fund family	544	0.75	0.43	0	1	1	1	1
Fraction of retail investors	544	0.56	0.43	0.00	0.07	0.64	1.00	1.00
Asset turnover ratio (%)	544	1.79	1.65	0.00	0.59	1.32	2.52	10.81
Total expense ratio (%)	544	0.61	0.27	0.13	0.48	0.60	0.73	1.42
CDS usage	544	0.50	0.50	0	0	0	1	1
<i>Panel C: High yield funds</i>								
Total NAV (in \$ millions)	346	3,044	2,704	388	1,120	1,882	4,395	13,400
Fund age (years)	346	21.6	12.0	4.0	13.0	20.0	28.0	73.0
Big fund family	346	0.74	0.44	0	0	1	1	1
Fraction of retail investors	346	0.84	0.28	0.00	0.85	0.96	1.00	1.00
Asset turnover ratio (%)	346	0.67	0.36	0.00	0.41	0.58	0.83	2.02
Total expense ratio (%)	346	1.06	0.27	0.18	0.86	1.10	1.22	1.75
CDS usage	346	0.27	0.45	0	0	0	1	1

Table 2: Fund Size and CDS Usage

Panel A shows funds' net asset values (NAV) in \$ million (columns 1 and 2), the number of CDS users out of the top 100 U.S. corporate bond funds (column 3), and the mean notional amount of a fund's total CDS positions at a particular point of time (column 4). Columns 5 to 7 show the total notional value of CDS positions over the NAV per fund. Panel B reports the distribution of the CDS book values (the unrealized gains or losses from CDS positions) relative to a fund's NAV.

Panel A: Fund size and CDS notional amounts

Period	NAV		CDS users	Mean CDS notional amount	CDS notional amount / NAV		
	Mean	Median			Mean	Min	Max
200402	4,247	2,041	21	103	0.0205	0.0012	0.1523
200501	4,379	2,001	30	216	0.0411	0.0014	0.2662
200502	4,520	1,996	26	315	0.0569	0.0045	0.2910
200601	4,579	2,074	33	296	0.0516	0.0016	0.2367
200602	4,959	2,158	35	387	0.0596	0.0001	0.2433
200701	5,347	2,289	48	444	0.0640	0.0011	0.4196
200702	5,692	2,359	54	527	0.0926	0.0013	0.6886
200801	6,026	2,285	58	787	0.1238	0.0029	1.1376
200802	5,659	2,038	60	632	0.1372	0.0012	1.1556

Panel B: CDS book value / NAV

Period	Mean	Std. dev.	Min	25%ile	Median	75%ile	Max
200402	0.00008	0.00025	-0.00029	0.00001	0.00003	0.00005	0.00091
200501	0.00020	0.00051	-0.00111	0.00003	0.00010	0.00032	0.00203
200502	-0.00045	0.00107	-0.00454	-0.00056	-0.00002	0.00009	0.00048
200601	0.00006	0.00039	-0.00109	-0.00011	0.00003	0.00013	0.00127
200602	0.00031	0.00122	-0.00206	-0.00002	0.00004	0.00026	0.00510
200701	-0.00001	0.00077	-0.00274	-0.00010	0.00000	0.00016	0.00276
200702	-0.00295	0.00730	-0.03617	-0.00201	-0.00031	0.00000	0.00191
200801	-0.00485	0.01239	-0.07431	-0.00357	-0.00092	-0.00001	0.00466
200802	-0.00888	0.02766	-0.18660	-0.00549	-0.00122	0.00009	0.01177

Table 3: The CDS Strategies

Panel A reports descriptive statistics of the sum of CDS notional amounts for four separate CDS strategies. We distinguish between CDS written on a single asset (single-name) and a portfolio of assets or an index (multi-name), and whether a position is short (protection sold) and long (protection bought). Panel B shows the notional amounts of CDS positions relative to a fund's NAV for each of the four primary CDS strategies separately (CDS users only). Columns 5 and 6 also report the net notional amounts over NAV. The netting is done per fund-period and separately for multi- and single-name CDS positions. The last column reports the net notional amounts over NAV for multi- and single-name CDS lumped together.

Panel A: Descriptive statistics of CDS strategies (notional values in \$ millions)

Reference asset, direction of position	N		Mean	Std. dev.	Min	25%ile	Median	75%ile	Max
	N	non-zero							
Multi-name, short	365	191	-153	585	-4,869	-56	-1	0	0
Multi-name, long	365	126	76	378	0	0	0	23	6,295
Single-name, short	365	289	-184	688	-7,986	-77	-20	-3	0
Single-name, long	365	200	61	294	0	0	3	30	4,632

Panel B: CDS strategies over time

Period	CDS notional amount / NAV				CDS net notional amount / NAV		CDS net notional amount / NAV
	Multi-name		Single-name		Multi-name	Single-name	
	Long	Short	Long	Short			
200402	0.074	-0.014	0.011	-0.010	0.011	-0.006	-0.002
200501	0.023	-0.036	0.013	-0.018	-0.026	-0.013	-0.026
200502	0.037	-0.042	0.014	-0.020	-0.019	-0.012	-0.023
200601	0.035	-0.031	0.018	-0.018	0.000	-0.008	-0.007
200602	0.053	-0.027	0.024	-0.024	0.010	-0.007	-0.001
200701	0.036	-0.030	0.016	-0.031	0.001	-0.014	-0.012
200702	0.035	-0.053	0.019	-0.040	-0.023	-0.019	-0.035
200801	0.069	-0.086	0.019	-0.047	-0.051	-0.027	-0.059
200802	0.061	-0.093	0.044	-0.036	-0.039	0.000	-0.026
200402- 200802	0.047	-0.046	0.020	-0.027	-0.015	-0.012	-0.021

Table 4: The Determinants of CDS Usage

This table reports the marginal effects (I to IV) and standard coefficients (V and VI) of logit regressions. The dependent variable is a dummy variable that equals 1 if a fund used CDS during a semi-annual period and zero otherwise. Models V and VI use only those funds that began or terminated using CDS during the observation period. The sample period is 2004 – 2008 and the sample frequency is semi-annual. *Investment grade* is a dummy variable that equals 1 for investment grade funds and 0 for high yield funds. The definitions of all other independent variables can be found in Table 1. Standard errors are reported in parentheses. They are clustered at the fund level in models I and II. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

Variables	I	II	III	IV	V	VI
ln(total net asset value)	0.0324 (0.0507)	0.0579 (0.0519)	-0.0453 (0.0614)	0.0075 (0.0510)	-0.4591 (0.8306)	0.0550 (1.0107)
Asset turnover ratio	0.0666 (0.0423)	0.0666* (0.0378)	0.0973*** (0.0545)	0.0883*** (0.0523)	0.8358*** (0.3129)	0.8712** (0.3624)
ln(fund age)	0.1969** (0.0968)	0.1681* (0.0917)	0.3243** (0.2220)	0.1890 (0.1597)	-3.3345 (6.2481)	-4.2056 (6.9114)
Big fund family (dummy)	0.3026*** (0.0801)	0.2937*** (0.0769)	0.3249*** (0.1680)	0.2651*** (0.1502)		
Total expense ratio	0.0832 (0.1886)	0.0785 (0.1777)	-0.1720 (0.2961)	-0.0737 (0.2286)	-16.0737** (7.8925)	-16.0386* (9.0129)
Investment grade (dummy)	0.1631 (0.1082)	0.1534 (0.1059)	0.2419 (0.1868)	0.2059 (0.1671)		
Fraction of retail investors	-0.2154* (0.1218)	-0.1897 (0.1143)	-0.2273* (0.1594)	-0.0784 (0.1199)	-1.3628 (1.4524)	10.9256 (9.3730)
Fund random effects	No	No	Yes	Yes	No	No
Fund fixed effects	No	No	No	No	Yes	Yes
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
2008 (second half) included	Yes	No	Yes	No	Yes	No
McFadden R square	0.1687	0.1609	0.4092	0.3835	0.5165	0.4842
N	890	792	890	792	432	360

Table 5: The Determinants of CDS Strategies

This table shows the second stage regression results of a Heckman selection model. The first stage estimates the determinants of the decision to use CDS analog to the regressions reported in Table 3. The second stage models the use of one of the four principal CDS strategies, measured by the notional principal over a fund's NAV. We regress changes in the use of each strategy on lagged fund returns (*Return over fund-based benchmark_{t-1}* and *Return over passive benchmark_{t-1}*). The lagged fund returns are from the first half of a calendar year, while the CDS strategy variable is from the second half of the calendar year. See Appendix B for a description of the two benchmarks used. Δ *Credit spread_t* is the second independent variable. It is the change of the credit spread of the average yield on Baa-rated corporate debt over 10-year U.S. Treasury securities (as in Figure 3) between the first and the second half of the calendar year. Standard errors are reported in parentheses. *,**,*** indicate significance at the 10%, 5% and 1% levels respectively.

Variables	$\Delta(\text{Notional amount (short) / NAV})_t$		$\Delta(\text{Notional amount (long) / NAV})_t$	
<i>Panel A: Multi-name CDS</i>				
Intercept	0.0030 (0.0124)	0.0008 (0.0124)	0.0029 (0.0057)	0.0028 (0.0057)
Return over fund-based benchmark _{t-1}	2.1131** (0.9588)		0.2396 (0.4410)	
Return over passive benchmark _{t-1}		1.0500* (0.6359)		0.2349 (0.2891)
Δ Credit spread _t	-0.0502** (0.0215)	-0.0459** (0.0218)	-0.0099 (0.0099)	-0.0091 (0.0099)
<i>Panel B: Single-name CDS</i>				
Intercept	-0.0021 (0.0106)	-0.0018 (0.0106)	0.0057 (0.0056)	0.0060 (0.0056)
Return over fund-based benchmark _{t-1}	-0.3970 (0.8216)		-0.4157 (0.4344)	
Return over passive benchmark _{t-1}		-0.3106 (0.5391)		-0.2924 (0.2851)
Δ Credit spread _t	-0.0183 (0.0184)	-0.0194 (0.0185)	-0.0012 (0.0098)	-0.0023 (0.0098)
N	359	359	359	359
N, uncensored	99	99	99	99

Table 6: Average Fund Returns and the Standard Deviation of Returns

This table reports fund return and standard deviation of fund return characteristics of the top 100 U.S. mutual corporate bonds funds between 2004 and 2008. The three factor alphas include a bond market factor, a high yield, and a mortgage securities factor according to Huij and Derwall (2008). We provide constant alphas and time-varying alphas. The latter are estimated by a smoothed Kalman filter. Panel B shows return differences between funds that use CDS and funds that do not and between funds that were net short in CDS and funds that were net long. We consider funds' raw returns, as well as fund returns relative to two benchmarks. See Appendix B for details. We use univariate OLS regressions in Panels I and II with standard errors that are clustered at the fund level to test whether the differences are significant. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

Panel A: Descriptive statistics

	N	Mean	Std. dev.	Min	Median	Max
<i>Panel I: Average semi-annual returns</i>						
Returns	890	0.0101	0.0498	-0.2375	0.0157	0.0813
Returns over fund-based benchmarks	890	-0.0012	0.0167	-0.1432	0.0011	0.0607
Returns over passive benchmarks	890	-0.0024	0.0180	-0.1498	-0.0006	0.0837
Three-factor alpha (constant)	890	0.0021	0.0014	-0.0074	0.0022	0.0050
Three-factor alpha (time-varying)	890	-0.0008	0.0034	-0.0467	-0.0002	0.0121
<i>Panel II: Average semi-annual standard deviation of monthly returns</i>						
Returns	890	0.0220	0.0196	0.0066	0.0159	0.1784
Returns over fund-based benchmarks	890	0.0123	0.0143	0.0019	0.0079	0.1514
Returns over passive benchmarks	890	0.0170	0.0171	0.0052	0.0112	0.1578

Panel B: Two-sample comparisons

Period	CDS			CDS users		
	Non-users	Users	Difference	Net short	Net long	Difference
<i>Panel A: Average semi-annual returns</i>						
Returns	0.0177	-0.0009	-0.0186***	-0.0016	0.0007	0.0022
Returns over fund-based benchmarks	0.0003	-0.0032	-0.0035***	-0.0037	-0.0021	0.0016
Returns over passive benchmarks	-0.0006	-0.0049	-0.0043***	-0.0058	-0.0029	0.0029
Three-factor alpha (constant)	0.0022	0.0018	-0.0004**	0.0018	0.0019	0.0001
Three-factor alpha (time-varying)	-0.0004	-0.0014	-0.001***	-0.0016	-0.0012	0.0004
<i>Panel B: Average semi-annual standard deviation of monthly returns</i>						
Returns	0.0192	0.0261	0.0069***	0.0268	0.0246	-0.0022
Returns over fund-based benchmarks	0.0106	0.0148	0.0042***	0.0157	0.0127	-0.0030*
Returns over passive benchmarks	0.0144	0.0207	0.0063***	0.0219	0.0181	-0.0037*

Table 7: Fund Returns – Multivariate Regression Results

This table shows OLS regression results of the semi-annual fund returns and three factor alphas of the top 100 U.S. mutual corporate bond funds. In column 1, the dependent variable is the funds' raw returns. In columns 2 and 3, the dependent variables are funds' returns relative to a benchmark. See Appendix B for details. In columns 4 and 5, the dependent variables are different three factor alphas. See the previous table for explanations. *CDS* is a dummy variable that equals 1 if the fund used CDS positions in the respective semi-annual period and 0 otherwise. *Investment grade* is a dummy variable that equals 1 for investment grade funds and 0 for high yield funds. Definitions of the other control variables are in Table 1. Standard errors are reported in parentheses and are clustered at the fund level. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

Variable	Returns	Returns over benchmark		Three-factor alpha	
		Fund-based	Passive	Constant	Time-varying
Intercept	-0.1299*** (0.0076)	-0.0433*** (0.0062)	-0.0412*** (0.0068)	0.0014 (0.0010)	-0.0061*** (0.0017)
CDS	-0.0036** (0.0014)	-0.0020* (0.0011)	-0.0027** (0.0013)	-0.0004** (0.0002)	-0.0001 (0.0004)
ln(total net asset value)	0.0029*** (0.0007)	0.0020*** (0.0006)	0.0021*** (0.0006)	0.0003*** (0.0001)	0.0004** (0.0002)
Asset turnover ratio	-0.0002 (0.0004)	-0.0003 (0.0003)	-0.0003 (0.0003)	-0.0000 (0.0000)	-0.0001 (0.0001)
ln(fund age)	-0.0001 (0.0010)	-0.0003 (0.0009)	-0.0002 (0.0010)	-0.0005** (0.0002)	-0.0004* (0.0002)
Big fund family (dummy)	0.0020* (0.0012)	0.0014 (0.0009)	0.0016 (0.0010)	-0.0003 (0.0002)	-0.0003 (0.0003)
Investment grade (dummy)	0.0044*** (0.0013)	0.0039*** (0.0011)	0.0059*** (0.0013)	0.0008** (0.0003)	0.0005 (0.0003)
Fraction of retail investors	0.0017 (0.0017)	0.0011 (0.0014)	0.0014 (0.0015)	0.0005* (0.0003)	0.0002 (0.0003)
Time fixed effects	Yes	Yes	Yes	Yes	Yes
Adj. R square	0.8397	0.3054	0.2216	0.1271	0.2255
N	890	890	890	890	890

Table 8: Standard Deviation of Returns - Multivariate Regression Results

This table shows OLS regression results of the standard deviation of monthly fund returns of the top 100 U.S. mutual corporate bond funds. In column 1, the dependent variable is the funds' raw returns. In columns 2 and 3, the dependent variables are funds' returns relative to a benchmark. See Appendix B for details. *CDS* is a dummy variable that equals 1 if the fund used CDS positions in the respective semi-annual period and 0 otherwise. *Investment grade* is a dummy variable that equals 1 for investment grade funds and 0 for high yield funds. Definitions of the other control variables are in Table 1. Standard errors are reported in parentheses and are clustered at the fund level. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

Variable	Standard deviation of fund returns	Standard deviation of fund returns over fund-based benchmark returns	Standard deviation of fund returns over passive benchmark returns
Intercept	0.0712*** (0.0049)	0.0470*** (0.0045)	0.0644*** (0.0046)
CDS	0.0007 (0.0008)	0.0006 (0.0008)	0.0021** (0.0008)
ln(total net asset value)	0.0005 (0.0004)	0.0001 (0.0004)	-0.0002 (0.0005)
Asset turnover ratio	-0.0004* (0.0002)	-0.0006** (0.0003)	-0.0007*** (0.0003)
ln(fund age)	-0.0014** (0.0006)	-0.0011 (0.0007)	-0.0013* (0.0008)
Big fund family (dummy)	0.0012 (0.0007)	0.0005 (0.0006)	0.0007 (0.0009)
Investment grade (dummy)	-0.0017* (0.0010)	-0.0009 (0.0009)	-0.0024** (0.0010)
Fraction of retail investors	-0.0008 (0.0012)	-0.0003 (0.0012)	-0.0009 (0.0012)
Time fixed effects	Yes	Yes	Yes
Adj. R square	0.8003	0.6400	0.7481
N	890	890	890

Table 9: Do Bond Fund Managers Correctly Anticipate Future Credit Spread Changes?

This table shows fixed effect panel regression results of the four principal CDS strategies: multi-name (short) multi-name (long), single-name (short), and single-name (long). In Panel A we consider multi-name CDS positions, while in Panel B we consider single-name CDS positions. In order to test whether fund managers correctly adjust their CDS positions in relation to future credit spread changes, we regress changes in the use of each strategy, measured by the notional principal over a fund's NAV, on future credit spread changes. The credit spread is measured by the Baa-rated bond yield over 10-year Treasury yields (as in Figure 3). We include fund fixed effects in all regressions. In robustness checks we exclude the second half of 2008, which was characterized by highly unusual market conditions. Standard errors are reported in parentheses and are clustered at the fund level. *, **, *** indicate significance at the 10%, 5% and 1% levels respectively.

Variables	Δ (Notional short / NAV) _t		Δ (Notional long / NAV) _t	
<i>Panel A: Multi-name CDS</i>				
Intercept	0.0026 (0.0045)	0.0005 (0.0049)	0.0016 (0.0024)	0.0001 (0.0025)
Δ Credit spread _{t+1}	-2.0768*** (0.7688)	-2.1678** (0.8556)	0.3002 (0.4041)	0.4943 (0.4402)
Fund fixed effects	Yes	Yes	Yes	Yes
2008 (second half) included	Yes	No	Yes	No
Adj. R square	0.0495	0.0818	-0.0005	0.0068
N	284	228	284	228
<i>Panel B: Single-name CDS</i>				
Intercept	-0.0031* (0.0017)	-0.0069*** (0.0016)	0.0093** (0.0044)	0.0020* (0.0011)
Δ Credit spread _{t+1}	-0.3090 (0.2836)	-0.1477 (0.2747)	-0.7398 (0.7571)	-0.0956 (0.1883)
Fund fixed effects	Yes	Yes	Yes	Yes
2008 (second half) included	Yes	No	Yes	No
Adj. R square	-0.0012	-0.0031	0.0002	-0.0032
N	284	228	284	228

Appendix A: The Sample

The table contains the names of the top 100 U.S. corporate bond funds as of the second quarter of 2004, the net asset values (in \$ million), and the Lipper fund classes. All data is from the CRSP mutual fund summary.

Fund name	Total net assets	Fund category
PIMCO Funds: Pacific Investment Management Series: Total Return Fund	73,202	Intermediate Investment Grade Debt Fund
Vanguard Bond Index Funds: Vanguard Total Bond Market Index Fund	26,864	Intermediate Investment Grade Debt Fund
Vanguard Fixed Income Securities Funds: Vanguard Short-Term Corporate Fund	17,752	Short Investment Grade Debt Funds
Bond Fund of America, Inc	17,621	Corporate Debt Funds A Rated
PIMCO Funds: Pacific Investment Management Series: Low Duration Fund	14,470	Short Investment Grade Debt Funds
American High-Income Trust	8,896	High Current Yield Funds
Vanguard Fixed Income Securities Funds: Vanguard High-Yield Corporate Fund	8,743	High Current Yield Funds
Lord Abbett Bond-Debenture Fund, Inc	8,212	High Current Yield Funds
Pioneer High Yield Fund, Inc	7,665	High Current Yield Funds
Fidelity Commonwealth Trust: Fidelity Intermediate Bond Fund	6,775	Short-Intmtd Investment Grade Debt Fund
PIMCO Funds: Pacific Investment Management Series: High Yield Fund	6,759	High Current Yield Funds
Dodge & Cox Income Fund	6,629	Corporate Debt Funds A Rated
Oppenheimer Strategic Funds Trust: Oppenheimer Strategic Income Fund	6,182	Multi-Sector Income Funds
Fidelity Fixed-Income Trust: Fidelity Investment Grade Bond Fund	5,732	Intermediate Investment Grade Debt Fund
Putnam Diversified Income Trust	5,533	Multi-Sector Income Funds
Fidelity Fixed-Income Trust: Fidelity Short-Term Bond Fund	5,045	Short Investment Grade Debt Funds
Intermediate Bond Fund of America	5,039	Short-Intmtd Investment Grade Debt Fund
Fidelity Concord Street Trust: Fidelity US Bond Index Fund	4,768	Intermediate Investment Grade Debt Fund
Vanguard Bond Index Funds: Vanguard Short-Term Bond Index Fund	4,607	Short Investment Grade Debt Funds
Evergreen Select Fixed Income Trust: Evergreen Core Bond Fund	4,517	Intermediate Investment Grade Debt Fund
Vanguard Fixed Income Securities Funds: Vanguard Long-Term Corporate Fund	4,444	Corporate Debt Funds A Rated
Vanguard Fixed Income Securities Funds: Vanguard Intermediate-Term Corporate	4,226	Intermediate Investment Grade Debt Fund
MainStay Funds: MainStay High Yield Corporate Bond Fund	4,226	High Current Yield Funds
Fidelity Summer Street Trust: Fidelity Capital & Income Fund	4,149	High Current Yield Funds
SEI Institutional Managed Trust: Core Fixed Income Portfolio	3,949	Intermediate Investment Grade Debt Fund
T Rowe Price High Yield Fund, Inc	3,897	High Current Yield Funds
Vanguard Bond Index Funds: Vanguard Intermediate-Term Bond Index Fund	3,860	Intermediate Investment Grade Debt Fund
Western Asset Funds, Inc: Western Asset Core Plus Bond Portfolio	3,431	Intermediate Investment Grade Debt Fund
Putnam High Yield Trust	2,938	High Current Yield Funds
Franklin High Income Trust: AGE High Income Fund	2,849	High Current Yield Funds
AXP Diversified Bond Fund, Inc	2,817	Intermediate Investment Grade Debt Fund
Fidelity Fixed-Income Trust: High Income Fund	2,786	High Current Yield Funds
Calvert Fund: Calvert Income Fund	2,777	Corporate Debt Funds BBB-Rated
Sanford C Bernstein Fund, Inc: Intermediate Duration Portfolio	2,691	Intermediate Investment Grade Debt Fund

Appendix A continued

Fund name	Total net assets	Fund category
American Express Funds: AXP High Yield Bond Fund	2,614	High Current Yield Funds
Putnam Income Fund	2,596	Corporate Debt Funds A Rated
T Rowe Price New Income Fund, Inc	2,552	Corporate Debt Funds A Rated
GE S&S Program Funds: S&S Income Fund	2,515	Intermediate Investment Grade Debt Fund
BlackRock Funds: Core Bond Total Return Portfolio	2,506	Intermediate Investment Grade Debt Fund
Loomis Sayles Funds I: Loomis Sayles Bond Fund	2,412	Corporate Debt Funds BBB-Rated
Western Asset Funds, Inc: Western Asset Core Bond Portfolio	2,406	Intermediate Investment Grade Debt Fund
Fidelity Advisor Series II: Fidelity Advisor High Income Advantage Fund	2,405	High Current Yield Funds
Scudder High Income Fund	2,386	High Current Yield Funds
Fidelity Charles Street Trust: Spartan Investment Grade Bond Fund	2,355	Intermediate Investment Grade Debt Fund
Fidelity School Street Trust: Fidelity Strategic Income Fund	2,336	Multi-Sector Income Funds
Morgan Stanley Institutional Fund Trust: Core Plus Fixed Income Portfolio	2,319	Corporate Debt Funds BBB-Rated
PIMCO Funds: Pacific Investment Management Series: Total Return Fund II	2,319	Intermediate Investment Grade Debt Fund
Scudder Advisor Funds: Preservation Plus Income Fund	2,141	Intermediate Investment Grade Debt Fund
Nations Fund Trust: Nations Bond Fund	2,120	Intermediate Investment Grade Debt Fund
Merrill Lynch Bond Fund, Inc: Core Bond Portfolio	1,993	Intermediate Investment Grade Debt Fund
First American Investment Funds, Inc: Core Bond Fund	1,991	Corporate Debt Funds A Rated
Goldman Sachs Trust: Goldman Sachs High Yield Fund	1,939	High Current Yield Funds
Dryden High Yield Fund, Inc	1,928	High Current Yield Funds
Frank Russell Investment Company: Diversified Bond Fund	1,921	Intermediate Investment Grade Debt Fund
BlackRock Funds: Low Duration Bond Portfolio	1,891	Short Investment Grade Debt Funds
Federated High Income Bond Fund, Inc	1,862	High Current Yield Funds
Merrill Lynch Bond Fund, Inc: High Income Portfolio	1,846	High Current Yield Funds
Salomon Brothers Series Funds, Inc: Salomon Brothers High Yield Bond Fund	1,845	High Current Yield Funds
Fidelity Advisor Series II: Fidelity Advisor Strategic Income Fund	1,813	Multi-Sector Income Funds
FPA New Income, Inc	1,732	Corporate Debt Funds A Rated
USAA Mutual Fund, Inc: Income Fund	1,698	Corporate Debt Funds A Rated
Columbia High Yield Fund, Inc	1,667	High Current Yield Funds
Oppenheimer Champion Income Fund	1,658	High Current Yield Funds
Frank Russell Investment Company: Multistrategy Bond Fund	1,619	Corporate Debt Funds BBB-Rated
PIMCO Funds: Pacific Investment Management Series: Moderate Duration Fund	1,608	Short-Intmtd Investment Grade Debt Fund
Oppenheimer High Yield Fund	1,588	High Current Yield Funds
Eaton Vance Income Fund of Boston	1,567	High Current Yield Funds
T Rowe Price Short-Term Bond Fund, Inc	1,556	Short Investment Grade Debt Funds
SEIX Funds, Inc: SEIX High Yield Fund	1,515	High Current Yield Funds

Appendix A continued

Fund name	Total net assets	Fund category
Harbor Fund: Harbor Bond Fund	1,507	Intermediate Investment Grade Debt Fund
MFS Series Trust IX: MFS Bond Fund	1,447	Corporate Debt Funds BBB-Rated
John Hancock Strategic Series: John Hancock Strategic Income Fund	1,445	Multi-Sector Income Funds
MFS Series Trust III: MFS High Income Fund	1,436	High Current Yield Funds
One Group Mutual Funds: One Group Income Bond Fund	1,381	Intermediate Investment Grade Debt Fund
First American Investment Funds, Inc: Intermediate Term Bond Fund	1,350	Short-Intmtdt Investment Grade Debt Fund
PIMCO Funds: Pacific Investment Management Series: Total Return Fund III	1,346	Intermediate Investment Grade Debt Fund
Fidelity Advisor Series IV: Fidelity Advisor Intermediate Bond Fund	1,314	Short-Intmtdt Investment Grade Debt Fund
Evergreen Select Fixed Income Trust: Evergreen Short Intermediate Bond Fund	1,295	Short-Intmtdt Investment Grade Debt Fund
AIM Investment Securities Funds: AIM High Yield Fund	1,281	High Current Yield Funds
Metropolitan West Funds: Total Return Bond Fund	1,270	Intermediate Investment Grade Debt Fund
Fidelity Advisor Series II: Fidelity Advisor Short Fixed-Income Fund	1,241	Short Investment Grade Debt Funds
John Hancock Sovereign Bond Fund: John Hancock Bond Fund	1,236	Corporate Debt Funds A Rated
Putnam High Yield Advantage Fund	1,217	High Current Yield Funds
Federated Total Return Series, Inc: Federated Total Return Bond Fund	1,210	Intermediate Investment Grade Debt Fund
One Group Mutual Funds: One Group High Yield Bond Fund	1,194	High Current Yield Funds
Janus Investment Fund: Janus Flexible Income Fund	1,193	Intermediate Investment Grade Debt Fund
Nations Fund Trust: Nations Short-Term Income Fund	1,189	Short Investment Grade Debt Funds
Goldman Sachs Trust: Goldman Sachs Core Fixed Income Fund	1,174	Intermediate Investment Grade Debt Fund
Smith Barney Income Funds: Diversified Strategic Income Fund	1,174	Multi-Sector Income Funds
Smith Barney Income Funds: High Income Fund	1,154	High Current Yield Funds
MassMutual Institutional Funds: MassMutual Core Bond Fund	1,120	Intermediate Investment Grade Debt Fund
Federated Investment Series Funds, Inc: Federated Bond Fund	1,113	Corporate Debt Funds BBB-Rated
Frank Russell Investment Company: Short Term Bond Fund	1,112	Short Investment Grade Debt Funds
Evergreen Fixed Income Trust: Evergreen High Yield Bond Fund	1,111	High Current Yield Funds
First American Investment Funds, Inc: Short Term Bond Fund	1,074	Short Investment Grade Debt Funds
SEI Institutional Managed Trust: High Yield Bond Portfolio	1,065	High Current Yield Funds
Vanguard Bond Index Funds: Vanguard Long-Term Bond Index Fund	1,061	Corporate Debt Funds A Rated
Columbia Funds Trust VIII: Columbia Intermediate Bond Fund	1,054	Intermediate Investment Grade Debt Fund
Nations Funds Trust: Nations High Yield Bond Fund	1,040	High Current Yield Funds
Federated Fixed Income Securities, Inc: Federated Strategic Income Fund	1,032	Multi-Sector Income Funds

Appendix B: Construction of Benchmarks

We use two benchmarks to evaluate the performance of our sample of corporate bond funds. The first benchmark is calculated by the average return of all U.S. corporate bond funds of the respective Lipper fund class of Panel I. We call this benchmark the *fund-based benchmark*. The second benchmark measures the return of a portfolio of corporate bonds that is comparable to the bond holdings of a particular fund. Panel I shows how we match Bank of America Merrill Lynch bond indices to the seven Lipper fund classes that occur in our sample. If a reasonable match cannot be found we create a new index from two or three bond indices. We use Moody's U.S. corporate rating distributions to determine the weights for the construction of the new indices. In the case of the Intermediate Investment Grade Debt Funds (Short Investment Grade Debt Funds) there is no A 3-5Y (1-3Y) index. These weights are given to AA and BBB indices accordingly. Panel II shows Moody's U.S. corporate rating distribution for the period 2004 to 2008. This data is extracted from Moody's Default Report 2008.

Panel I: Construction of passive benchmarks

Lipper fund class	Weight	Bond index
<i>Panel A: Investment grade funds</i>		
Corporate Debt Funds (A-Rated)	100%	US CORP A
Corporate Debt Funds (BBB-Rated)	100%	US CORP BBB
Intermediate Investment Grade Debt Funds	5%	US CORP AAA 3-5Y
	40%	US CORP AA 3-5Y
	55%	US CORP BBB 3-5Y
Short Investment Grade Debt Funds	5%	US CORP AAA 1-3Y
	40%	US CORP AA 1-3Y
	55%	US CORP BBB 1-3Y
Short-Intermediate Investment Grade Debt Funds	26%	US CORP AA-AAA 1-5Y
	74%	US CORP BBB-A 1-5Y
<i>Panel B: High yield funds</i>		
Multi-Sector Income Funds	100%	GLB BROAD
High Current Yield Funds	54%	US HY CORP.BB
	29%	US HY CORP.B
	17%	US HY CORP.C

Panel II: Moody's U.S. corporate rating distribution

Rating	2004	2005	2006	2007	2008	Average	Ratio
Aaa	143	144	139	150	182	152	3%
Aa	611	632	670	702	795	682	13%
A	1,204	1,242	1,279	1,298	1,240	1,253	24%
Baa	1,175	1,175	1,176	1,164	1,138	1,166	22%
Ba	555	559	598	598	590	580	11%
B	901	967	1,041	1,197	1,210	1,063	20%
Caa-C	281	330	348	334	425	344	7%
Investment grade	3,133	3,193	3,264	3,314	3,355	3,252	62%
High yield	1,737	1,856	1,987	2,129	2,225	1,987	38%
All	4,870	5,049	5,251	5,443	5,580	5,239	100%