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## What Does a Mutual Fund's Term Tell Investors?

by

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In a previous article, we highlighted a flaw in the average credit quality statistic frequently reported by bond mutual funds. That statistic understates the credit risk in bond portfolios if the portfolios contain bonds of diverse credit ratings. We explained that portfolio managers wanting to increase their yields could adjust their holdings to increase the credit risk investors were exposed to without increasing the risk signaled by the average credit quality statistic.

In this article we address a similar problem with bond mutual funds' reporting of the average term of their portfolios. The somewhat ambiguous nature of this statistic provides an opportunity for portfolio managers to significantly increase the funds' risks, credit risk in particular, by holding very long-term bonds while claiming to expose investors to only the risks of very short-term bonds.

Morningstar uses a fund-provided statistic – the average effective duration – to classify funds as ultra short, short, intermediate or long-term. Funds have figured out how to hold long-term bond portfolios yet be classified as ultra short-term and short-term bond funds. We show that extraordinary losses suffered by these funds in 2008 can be explained by the how much the bond funds' unadulterated weighted average maturity exceeded the maturities typically expected in short term bond funds.

### Introduction

Fund companies and portfolio managers can increase their revenues, profits and bonuses by reporting higher returns than their peers since net investor flows into mutual funds follow past performance within a peer group.<sup>2</sup> A bond fund's peers are typically defined by the average credit quality and average term of their holdings. Our previous paper demonstrated how portfolio managers can increase their reported relative returns

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<sup>2</sup> See Chevalier and Ellison [1997] and Sirri and Tufano [1998].

within a peer group by spreading their bond holdings across credit ratings to take on more risk while leaving the reported average credit risk unchanged.<sup>3</sup>

Portfolio managers can also increase their reported yields within a term category although doing so requires more than just gaming a widely accepted but flawed statistic. In what follows we document examples of long term bond funds falsely marketed as ultra short-and short-term bond funds. Some funds reduced their portfolio's sensitivity to general levels of risk free interest rates to levels consistent with ultra short-term and short-term bonds using interest rate swaps or by holding mostly floating rate bonds but kept the credit risk of their long term bond portfolios un-hedged. We show that this strategy retained substantial credit risk and allowed some funds to report higher returns than their peers in 2002-2006 but caused the funds to suffer large losses in 2008 as credit spreads on their long term bonds increased significantly.

In 2001, the SEC adopted a Final Rule specifically on how mutual funds were to describe themselves.<sup>4</sup>

### **Names and Average Weighted Portfolio Maturity and Duration**

Investment companies investing in debt obligations often seek to distinguish themselves by limiting the maturity of the instruments they hold. These investment companies may call themselves, for example, "short-term," "intermediate-term," or "long-term" bond or debt funds. Historically, the Division of Investment Management has required investment companies with these types of names to have average weighted portfolio maturities of specified lengths. In particular, the Division has required an investment company that included the words "short-term," "intermediate-term," or "long-term" in its name to have a dollar-weighted average maturity of, respectively, no more than 3 years, more than 3 years but less than 10 years, or more than 10 years. Although the Proposing Release stated that the Division did not intend to continue to use these criteria, the Division has re-evaluated this position in light of its subsequent experience and the comments received on the Proposing Release. The Division has concluded that it will continue to apply these maturity criteria to investment companies that call themselves "short-

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<sup>3</sup> See Deng, McCann and O'Neal, [*Journal of Investing*, forthcoming]. FINRA responded to our paper by telling the mutual fund industry to stop reporting average credit quality for their bond portfolios unless the statistics were calculated by one of the recognized credit rating agencies.

<sup>4</sup> Release No. IC-24828; File No. S7-11-97 <http://www.sec.gov/rules/final/ic-24828.htm#average>

term," "intermediate-term," or "long-term" because they provide reasonable constraints on the use of those terms.

We note, however, that there may be instances where the average weighted maturity of an investment company's portfolio securities may not accurately reflect the sensitivity of the company's share prices to changes in interest rates. The Commission and the Division, therefore, do not intend compliance with the Division's maturity guidelines to act as a safe harbor in determining whether a name is misleading. In a case, for example, where an investment company's name was consistent with the Division's maturity guidelines, but the "duration" of the company's portfolio was inconsistent with the sensitivity to interest rates suggested by the company's name, the name may be misleading (footnotes omitted).

The central thesis of our paper is that the mutual fund industry has sold bond portfolios with weighted average maturities greater than 20 years as "ultra short-term" and "short-term" despite the SEC's clear guidance that these terms can only be applied to funds with average maturities of less than three years.<sup>5</sup>

### **Alternative measures of the length of a bond**

The "term" of a bond – how far distant in the future investors in bonds or bond portfolios receive cash flows - matters because the market value of a bond, other things equal, is lower and more sensitive to general levels of interest rates, credit risk and liquidity risk the longer the bond's term. \$1,000 to be received in 20 years is worth less than \$1,000 to be received in 10 years from the same issuer and the value of the 20-year bond will be more sensitive to changes in the creditworthiness of the issuer and the general level of interest rates than the 10-year bond.

An investor in bonds maturing in three months will not suffer significant losses if risk free interest rates, market-wide credit spreads or liquidity risk premiums increase – even if they increase substantially, because, unless the specific issuer defaults, the investor will receive the face value of the bond in three months. An investor in bonds maturing in thirty years on the other hand will suffer significant losses if market-wide credit spreads or liquidity risk premiums increase even if the term structure of risk free interest rates is unchanged.

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<sup>5</sup> The second paragraph makes clear that the SEC maturity guidelines do not establish a safe harbor in cases where complying with the rule would be misleading and reference the Piper Jaffray case from the early 1990s.

The maturity of a bond is the date by which the issuer commits to fully repay the principal or face value of the bond. Maturity is an unambiguous concept for non-amortizing bonds since all the principal is paid out on one date. The principal of an amortizing bond, on the other hand, is paid off over time and the maturity date is the date when the last principal payment is made. The weighted average life (“WAL”) of a bond is the average time to repayment of principal. The WAL will be less than the maturity for an amortizing bond and equal to the maturity for a non-amortizing bond.

Macaulay duration improves on maturity and weighted average life because it takes into account the timing of the portion of bond value recovered through coupon payments and weights the time to receipt of cash flows by the present value of the cash

flows making the statistic consistent with the valuation of bonds. Without qualification, “duration” typically means Macaulay duration. Duration is important because it allows us to estimate the effect of a parallel shift in the yield curve on the value of a bond or bond fund.

Modified duration is the Macaulay duration adjusted slightly to make the direct translation from changes in interest rates to changes in bond values easier. The modified duration tells us the rate of change of the bond’s value for small changes in the yield to maturity. The modified duration is Macaulay duration divided by one plus the yield to maturity. For non-amortizing coupon bonds, the modified duration equals between 40% and 60% of the maturity depending on the coupon and yield.

The Macaulay and modified duration calculations assume that the bond’s cash flows are unaffected by changes in interest rates. This assumption is incorrect for callable bonds and for

### Measures of the Term

Macaulay Duration =

$$\sum_{t=1}^T \left( \frac{PV_0(C_t)}{\sum_0^T PV_0(C_t)} \times t \right)$$

Effective Duration =

$$\frac{\Delta \sum_0^T PV_0(C_t)}{2 \times \Delta ytm \times P_0}$$

Spread Duration =

$$\frac{\Delta \sum_0^T PV_0(C_t)}{2 \times \Delta \text{credit spreads} \times P_0}$$

Average Maturity =

$$\sum_{j=1}^N \left( \frac{\text{Face Value}_j}{\sum \text{Face Value}_j} \right) \times T_j$$

floating rate bonds. Option-adjusted or “effective” duration was developed to capture the sensitivity of bonds to changes in the general level of the term structure of risk free or near risk free interest rates. To calculate effective duration, the term structure of interest rates is shifted up and down, deterministically or by simulation, and changes in the bond’s value are observed after taking into account changes in the bond’s likely period cash flows. Roughly speaking, effective duration is the ratio of the change in the bond’s value to the simulated change in risk free interest rates.

Effective duration was an important tool for assessing the interest rate risk in agency collateralized mortgage obligations (“CMOs”) because changes in the level of risk free interest rates caused cash flows to increase or decrease as homeowners adjusted their prepayment behavior to changes in interest rates. Also the interest rate sensitivity of CMOs was extremely sensitive to whether the securities had coupons that floated directly or inversely with interest rates.

While effective duration was an improvement on Macaulay duration for securities that have embedded options and have no credit risk like agency CMOs, it assumes the bonds have no credit risk and so is not a useful measure of risk for bonds with credit risk. Of particular importance to our current research, the following three bonds have the same effective duration as that statistic is reported by mutual funds even though the 30-year bonds are orders of magnitude more risky than the 3-month bond.

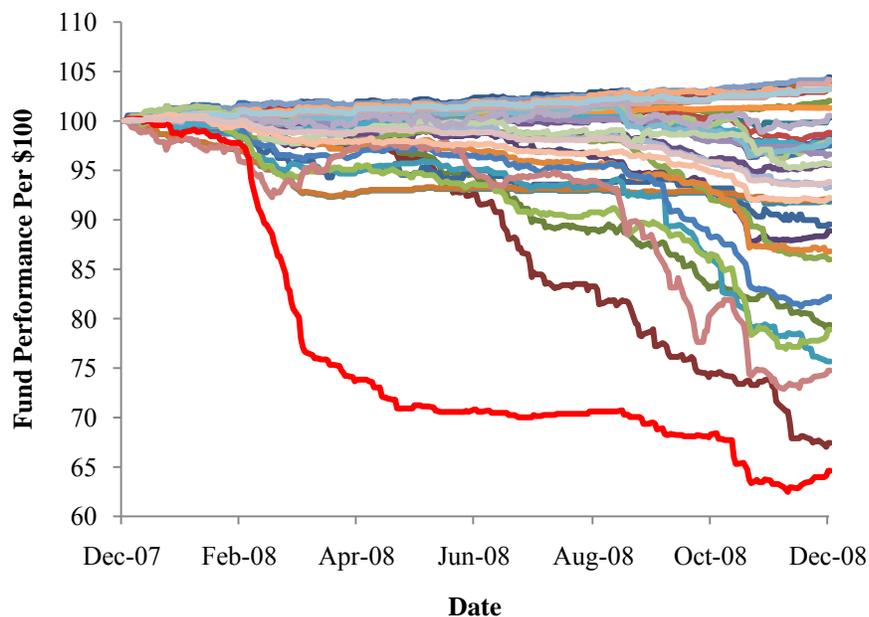
- 1) 30-year, A-rated floating-rate bond;
- 2) 30-year, A-rated fixed-rate bond paired with an interest rate swap; and
- 3) 3-month, A-rated bond.

While effective duration measures the sensitivity of changes in bond values to changes in a benchmark or reference interest rate typically LIBOR or Treasury yields, it ignores changes in interest rates caused by deviations from the reference interest rate. Spread duration measures the sensitivity of a bond’s value to changes in yield spreads. Changes in yield spreads arise because of changes in the credit risk and liquidity risk of the bond under examination. To calculate spread duration, a term structure of yield spreads is shifted up and down and changes in the bond’s value are calculated. Spread duration is the ratio of the change in the bond’s value to the simulated change in yield spreads and will roughly equal the traditional modified duration.

### Ultra short-term bond funds suffered long-term bond fund losses

In 2008 when credit spreads widened, investors suffered losses in many funds that had classified themselves as ultra short-term or short-term bond funds. Figure 1 plots the value of \$100 with re-invested dividends invested in 36 retail ultra short bond funds from January 1, 2008 to December 31, 2008. The losses during 2008 in these funds which had been marketed as low risk substitutes were substantial and varied significantly across funds. The average return including reinvested dividends across the 36 funds was -7.0% and the standard deviation was 11%. 6 of the 36 funds lost more than 20% with reinvested dividends.

Figure 1: Ultra short bond funds lost as much as 35% in 2008.



There were no coinciding widespread defaults by issuers of the bonds which were held in the funds and so losses should have been essentially non-existent as the short-term bonds matured and were redeemed at par. Even on a mark-to-market basis the losses should have been extremely small as the coupon payments exceeded the temporarily and only slightly reduced market value of short-term bonds. Nonetheless many ultra short-term and short-term bond funds lost more than 20% of their value. These losses occurred because of widening credit spreads on the ultra *long*-term bonds in the funds.

Morningstar groups bond funds into ultra short-term, short-term, intermediate-term and long-term categories based on the average effective duration reported by mutual funds. Investors compare funds within these categories and Morningstar assesses relative performance within these effective duration categories when assigning its Star<sup>®</sup> ratings. The losses suffered by ultra short bond funds in 2008 varied widely within Morningstar's Style Box<sup>®</sup> and were unrelated to the mutual funds' reported effective durations. Those losses could however be well explained by the weighted average maturities of the individual bonds held in the funds.

The average effective duration reported by mutual funds and used by Morningstar is not a useful measure of risk for ultra short-term and short-term bond funds. Effective duration as typically calculated only measures the sensitivity of bond prices to changes in the risk-free or index levels of interest rates. A bond or bond portfolio can have a lot of credit and liquidity risk and its value can be very sensitive to changes in credit quality, credit spreads and liquidity risk premiums and yet have an extremely low – even 0 - effective duration. As such, effective duration is a very poor measure of the sensitivity of the value of bonds with credit risk to changes in interest rates.

**Ultra short-term and short-term bond fund losses in 2008 occurred in proportion to the extent of the funds' misrepresentations**

We collected the fund holding data for 43 ultra-short bond funds in the Morningstar category and calculated the market-value weighted average maturity for each fund using the maturities of the individual holdings reported by Morningstar as of April 30, 2008. We have verified that the maturities of the individual bonds against maturities provided by Bloomberg. The holding data reported by the funds varies from November 2007 to April 2008 because mutual funds have different fiscal years. We calculated the average maturity without regard to the swaps, futures, swaps and other derivatives reported by Morningstar.

Figure 2: Ultra short term funds losses in 2008 resulted from the credit risk in long term bond holdings.

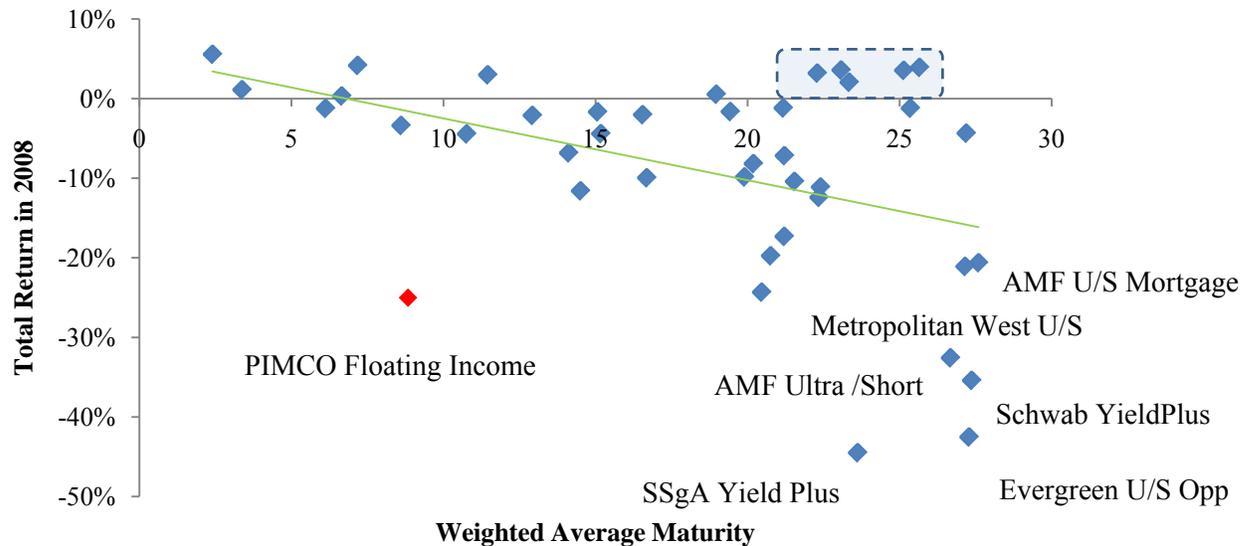


Figure 2 illustrates the clear relationship between the average maturity of the funds' bond portfolios and the losses in 2008 with some noticeable outliers. The PIMCO Floating Income Fund had an average maturity of 8.8 years and total return in 2008 is -25%. The fund held significant amounts of derivatives including almost 100% of its net assets in futures. The fund also held a significant amount of other derivatives such as CDS and swaps. The fund's returns were very different than other ultra short-term funds in previous years also. Five funds had weighted average maturities greater than 20 years but positive returns in 2008. These funds invested heavily in government agency bonds or treasury bonds. Thus, they were not subject to the same degree of credit risk in the other ultra short bond funds.

We isolate the impact of weighted average maturity and the proportion of the funds' holdings invested in agency and treasury securities with the following linear regression analysis.

$$\text{Equation 1) } Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4$$

$Y$  is each fund's total return in 2008,  $X_1$  is the fund's weighted average maturity,  $X_2$  is the percentage of the fund's portfolio invested in government securities,  $X_3$  is the weighted average probability of default calculated from the reported distribution of credit

quality and  $X_4$  is the average effective duration reported by funds and used by Morningstar to classify the funds as ultra short-term, short-term, intermediate-term or long-term. Table 1 reports the regression output:

**Table 1:** Ultra short-term bond funds' 2008 total returns regressed on maturity, government securities, probability of default and effective duration.

	<i>Coefficient</i>	<i>Std Err</i>	<i>t Stat</i>	<i>P-value</i>
$\beta_0$	8.13	4.02	2.02	0.052
$\beta_1$ (weighted average maturity)	-1.04	0.21	-5.03	0.00
$\beta_2$ (percent invested in government securities)	21.83	3.82	5.71	0.00
$\beta_3$ (weighted average probability of default)	-1.67	0.60	-2.79	0.01
$\beta_4$ (average effective duration)	-5.10	4.49	-1.14	0.26
R-squared = 0.65, n = 36				

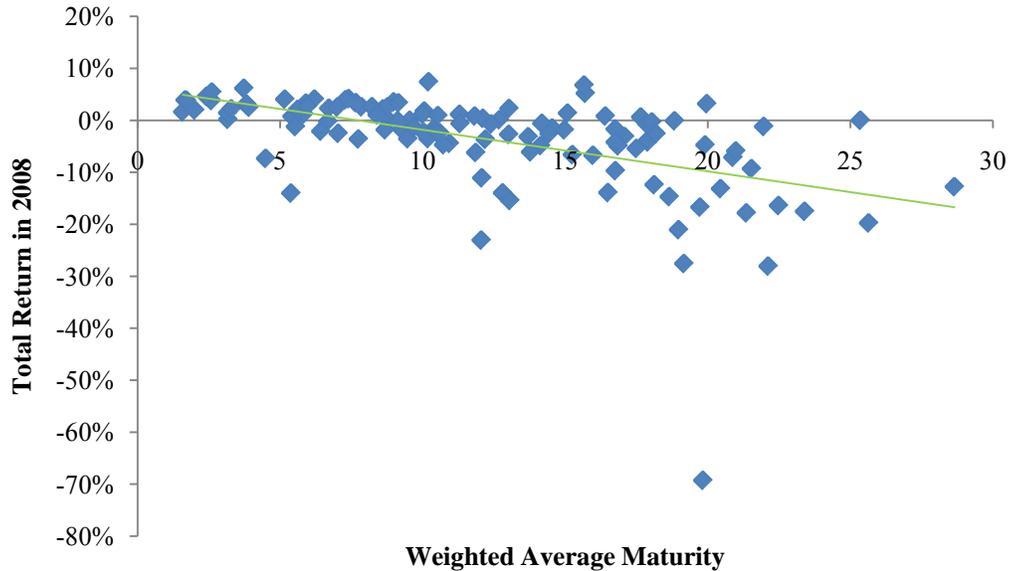
The ultra short-term bond funds' total returns in 2008 are significantly negatively related to the weighted average maturity and the weighted average probability of default and significantly positively related to the amount invested in government securities but are uncorrelated with the effective duration reported by the mutual funds and used by Morningstar. The losses in ultra short-term bond funds in 2008 occurred because these funds were, in fact, long term bond funds and the greater the average maturity of their holdings and the greater the credit risk of those holdings, the greater were the losses suffered by investors who were told they were buying ultra short-term bond funds.

### Short-term fund analysis

We have performed a similar analysis for short-term bond funds. Figure 3 illustrates the same wide variation in average maturities among self described short-term bonds funds as we saw for the ultra short-term bond funds. Figure 3 also shows that the losses in 2008 were greater the greater the true weighted average maturity of the funds' portfolio.<sup>6</sup>

<sup>6</sup> The outlier is the Regions Morgan Keegan Short Term Bond Fund. Its performance is much worse than the peer funds. This small fund was managed by the same portfolio manager who managed six RMK funds which imploded spectacularly in 2007.

Figure 3: The true average maturity of short term bond funds varied greatly and this variation explained losses in this category in 2008.



Our regression analysis of the short-term bond funds' total returns in 2008 parallels our results for the ultra short-term bond funds. The short-term funds' returns are significantly negatively related to the weighted average maturity and the amount invested in government securities but unrelated to the effective duration reported by the mutual funds and used by Morningstar. As with the ultra short-term funds, the losses in the short-term bond funds occurred because many of these funds were actually long-term bond funds. The greater the average maturity of their holdings, the greater were the losses suffered by investors who were told they were buying short-term bond funds.

**Table 2:** Short-term bond funds' 2008 total returns regressed on maturity, government securities, probability of default and effective duration.

	<i>Coefficient</i>	<i>Std Err</i>	<i>t Stat</i>	<i>P-value</i>
$\beta_0$	2.71	2.94	0.92	0.36
$\beta_1$ (weighted average maturity)	-0.78	0.14	-5.73	0.00
$\beta_2$ (percent invested in government securities)	8.69	3.57	2.44	0.02
$\beta_3$ (weighted average probability of default)	-1.51	0.78	-1.93	0.06
$\beta_4$ (average effective duration)	0.74	1.04	0.72	0.48
R-squared = 0.35, n = 99				

### **Examples of long term holdings in short-term funds**

At least one of the funds in Figure 1 supported its claim to be an ultra short-term bond fund by falsely reporting the maturities of the individual bonds it held. In the August 31, 2007 Annual Report for the Schwab YieldPlus Fund, Schwab reported that 60.7% of the securities in the portfolio matured within six months and that the weighted average maturity was 0.5 years.<sup>7</sup> In fact, as of August 31, 2007 only 1.7% of the market value of YieldPlus' securities matured within six months. Schwab used the next coupon date as the maturity date for the vast majority of these securities even for 30-year and 40-year bonds. This fund claimed to have a weighted average maturity of between 0.5 years and 1.4 years in 2006 and 2007 when the true weighted average maturity was between 25 and 30 years.

An example of the type of securities Schwab characterized as maturing within a month is the RBS Capital Trust IV Floating Rate Non-Cumulative Trust Preferred Securities. In the August 31, 2007 Annual Report Schwab reported that this non-cumulative trust preferred security matured on September 28, 2007 despite the Prospectus Supplement's clear statements: "The trust preferred securities are not redeemable at the option of the holders. The trust preferred securities are perpetual securities and have no maturity date."<sup>8</sup> Another example is the Goldman Sachs Capital III. On August 31, 2007 Schwab reported the bond was to mature the next day, September 1, 2007 even though the bond was to mature in 2049.

### **Conclusions**

On its website, the SEC tells investors:

**"Ultra-Short Bond Funds: Know Where You're Parking Your Money**

Ultra-short bond funds are mutual funds that generally invest in fixed income securities with extremely short maturities, or time periods in which they become due for payment."<sup>9</sup>

There is no ambiguity in the SEC's definition yet the average maturity of the 43 funds classified by Morningstar as "ultra short term" in early 2008 ranged from 1.8 years

<sup>7</sup> [www.sec.gov/Archives/edgar/data/869365/000095013407022637/f32306nvcsr.htm](http://www.sec.gov/Archives/edgar/data/869365/000095013407022637/f32306nvcsr.htm) at p. 6.

<sup>8</sup> [www.sec.gov/Archives/edgar/data/844150/000115697304001031/u47856b5e424b5.htm](http://www.sec.gov/Archives/edgar/data/844150/000115697304001031/u47856b5e424b5.htm) at S-10.

<sup>9</sup> [http://www.sec.gov/investor/pubs/ultra-short\\_bond\\_funds.htm](http://www.sec.gov/investor/pubs/ultra-short_bond_funds.htm)

to 27.6 years. The average weighted average maturity for these 43 ultra short-term bond funds was over 17 years and more than half the funds had average maturities greater than 20 years. The mutual fund industry's use of this category designation is clearly inconsistent with the SEC's statement to investors.

Bond mutual funds holding very long-term bond portfolios were sold to investors as ultra short-term and short-term bond funds. These funds largely held floating rate bonds or used derivatives to convert their fixed coupons to floating rate coupons. They reported effective durations as short as three months even though their 20- to 30-year average maturities would imply traditional durations of 10 to 15 years. Based on the funds' reported effective durations, Morningstar classified the funds as ultra short-term or short-term funds. The funds were effectively short-term bond funds with credit default swaps written on long term bonds. The extraordinary credit risk resulting from holding (or insuring) long-term, non-government securities caused the funds to predictably suffer the same losses as portfolios of 20-year and 30-year bonds when credit spreads widened in 2008.

Investors would be better served if mutual funds reported simple, unadulterated weighted average maturity and if the funds' bond holdings were consistent with "term" label the funds adopted. Funds that deviate from the 2001 SEC Rule cited at the beginning of this paper should make clear that they are exposing investors to risks typically associated with long-term bonds and not typically associated ultra short-term or short-term bonds.

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