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Does Turnover Matter for the Performance of Fixed Income ETFs?

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Abstract

This paper provides empirical evidence on the relation between portfolio turnover and fund performance in the exchange traded fund market using a sample of 70 actively managed fixed income funds from 2008-2017. Based on portfolio analysis, the results show that there is a significant positive relationship between turnover and Fama and French's (1993) five factor alpha. Further panel regression analysis, however, shows no significant relationship between turnover and performance after controlling for various fund characteristics. Overall, the results show no robust effect of turnover on the performance of fixed income ETFs.

Keywords: *Turnover, exchange traded funds, fixed income, monthly returns, actively managed*

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List of Tables

Table of Contents

Introduction

This paper analyzes the impact of turnover on the performance of fixed income exchange traded funds is analyzed. An exchange traded fund, or ETF, is a portfolio of securities that trade as one. An equity ETF consists of a bundle of stocks, a fixed-income ETF offers exposure to a bundle of securities that are bonds. Fixed-income ETFs target all areas of the market, from speculative emerging market debt to U.S. government debt. In the last decade, ETFs have grown rapidly. Fixed income ETFs as of February 2018 have grown to over $500B in assets under management, an investment tool that was virtually nonexistent 10 years prior now consumes roughly 15% of the market. In the years 2014-2017 alone assets under management has almost doubled, growing 95% with inflows outpacing this growth at 140%.

In 2002 the first bond ETF was introduced. These instruments invest in a portfolio of bonds designed to match the performance of a designated index. An example of one of these indices is the Barclays U.S. Aggregate Bond Index. A passively managed fund hold the securities that are in the index that it tracks, or a representative sample of the index holdings. When the composition within the index fund changes, so does the fund's holdings. The managers of these passively managed funds aren't seeking to produce returns greater than the benchmark they are paired to, the goal is simply matching its performance. These types of ETFs in the long term follow the market, and as the sector of the market that the ETF is in changes, so does the value of the passively managed ETF. The goal of these instruments is to follow the returns of the index that it tracks, not to have a higher return than the index. These passively managed funds have been an attractive

investment for long term investors, although they do not act to beat the index and realize immediate gains, in the long run the index that the ETF is tracking should grow as the market does.

In 2008 the Securities and Exchange Commission approved the first actively managed ETF. These actively managed funds have portfolio managers that attempt to choose bonds that will outperform the index over time and avoid those that they feel are likely to underperform. The goal of these managers is to identify bonds within the index that are undervalued/overvalued and invest accordingly as well as to position the portfolio for anticipated changes in interest rates or the market in general. This form of an ETF that was introduced during the financial crisis aims to beat the index that it tracks. Managers of these funds are generally accepted to have more skill in identifying profitable opportunities and beating the market. These funds do however have higher expenses incurred due to the active management as well as the transaction fees associated with the higher turnover than a passively managed fund.

When a fund manager makes a change within the portfolio it creates turnover. Turnover in the fixed income ETF market is the percentage of holdings within the ETF that have changed on an annual basis compared to the total assets under management. If a fund has a turnover ratio of 100% or more annually, this does not necessarily mean the fund liquidated all positions with which it began the year. This means that the total assets sold and bought in that year is equivalent to the total assets under management of the fund. A low turnover ratio (20-30%) would show that a fund has a buy and hold strategy. A fund with a higher turnover ratio, sometimes exceeding 100%, would be a fund that was often buying and selling positions to take advantage of profitable opportunities. In ETFs turnover is a crucial statistic to know as it captures the investment strategy by the manager as well as characteristics of the fund and manager.

Since actively managed funds are continuously shifting their portfolios in order to optimize profit and adjust to market conditions, they have a much higher turnover than index funds, which only change their holdings when the underlying index changes. This increase in turnover brings an increase in fees and expenses, making one of these funds more expensive to hold. This raises the question of whether paying more for one of these actively managed funds is worth it over a passively managed fund. The crucial difference between the two investment strategies is turnover. With active management an investor is paying for the knowledge and skill of the manager to outperform the index. This paper will look to examine if this increase in turnover will provide a higher return, meaning the active fund manager is trading on valuable information with skill, or if the increase in turnover is value destroying for a fund.

What is the role and impact of turnover in fixed income ETF's is an interesting question that has been relatively unexamined. The market for these financial instruments has greatly expanded in the last ten years. With billions of dollars having been invested into them, the growth within this market allows for the opportunity for further research. The potential for this growth to continue is also a driving factor in the need for more research on the subject, as more money flows into them these investment instruments should be researched in more detail. Within bond ETFs one of the most important variables that distinguish between actively managed funds and index funds is the portfolio turnover ratio. This paper will serve to help better explain the relationship of turnover and fixed income ETFs as well as how turnover impacts the performance of fixed income ETFs.

The sample consists of 70 actively managed fixed income ETFs. The funds monthly return, monthly net flow, monthly total net assets, manager tenure, expense ratio, and turnover data for

the years 2008-2017 are used. A univariate portfolio analysis is conducted with turnover as the independent variable used to sort the funds into three equally weighted portfolios. The average monthly average return and Fama and French's (1993) five factor alphas are the dependent variables. The highest portfolio by turnover rank is then compared to the lowest portfolio by turnover rank to determine if higher turnover funds return more than low turnover funds. A panel regression analysis is also used, testing the significance of turnover on the monthly risk adjusted return as well as the monthly five factor adjusted return of the funds. The univariate analysis shows significance for the five factor alpha test, and the panel regression analysis finds no significance between turnover and either of the dependent variables.

This paper contributes to the literature by expanding previous studies such as Wermers (2000) and Pastor, Lubos and Stambaugh (2016). The analysis of this paper expands to fixed income ETFs. While Wermers and Pastor have looked at stocks and mutual funds, this will focus on bonds and ETFs. It will examine the relationship of turnover and if this turnover is created by the ability of the active manager to churn their portfolio in order to create higher returns. This paper will also differentiate between the different classes of high yield and investment grade funds, giving a more in-depth breakdown of the relationship of turnover within different classes of ETFs. It will also offer insight into the differences between the Time period one and Time period two time periods in the ETF market and analyze the relationship between turnover and returns during both time periods respectively.

The rest of the paper proceeds as follows. Section 2 discusses previous literature on turnover and the performance of mutual funds and ETFs. In section 3 the hypothesis which is based on previous research is located. Section 4 discusses the data that is used in the empirical analysis. Section 5 explains the methodology that was used to analyze the data. In section 6 the empirical

results are presented on the impact of turnover on fixed income ETF performance. Section 7 contains the conclusion.

Literature Review

In this section, previous literature regarding the impact of turnover on mutual funds as well as ETFs is discussed. Section 2.1 describes what causes turnover in a mutual fund or ETF. Section 2.2 discusses the impact of turnover on the performance of mutual funds and ETFs, as well as relationships between turnover and variables used in section 4.

Causes of Turnover

A funds turnover ratio can vary and rise due to a plethora of causes. Pastor, Stambaugh, and Taylor (2016) suggest that turnover ratios are higher when the market environment falls within certain parameters. Their findings suggest that turnover ratios are higher in an environment where investor sentiment is high, stock volatility is high, and stock market liquidity is low. These market characteristics allow for more profitable opportunities for fund managers, as well as an increase in flows in to the funds as investor sentiment rises. These parameters are similar to that of the recovery period following the time period one which is the time period analyzed in the research by Li, Klein, and Zhao (2012) who find that the highest turnover ratios are found during the time following a financial crisis. Following a time when markets are severely down it is not unexpected that many old positions would be sold off in order to replace them with new more promising positions that arise as the market begins to see positive returns again.

Previous research finds a positive relationship between a short manager tenure and a high turnover ratio. Christoffersen and Sarkissian (2011) find that one of the largest causes of turnover

is when a new manager takes control of the actively managed fund. They suggest that this could be due to the new manager possessing knowledge that the old manager did not have and begins to replace positions, or that the manager must prove they deserve the job by outperforming both the market and the old manager. This churning of the portfolio creates a much higher turnover ratio as positions are bought and sold off.

These authors also relate turnover to the size and location of a fund. In a major financial center, a fund will have more investors and assets under management. There will also be more information available to the fund manager in these locations, and due to this access to information more transactions will be executed in order to take advantage of profitable opportunities causing a higher turnover ratio. The availability of information and capital leads to on average a 6% higher turnover ratio for a fund in a major financial center than those that are managed in smaller financial centers. When a young manager, or a newly appointed manager, is located in a major financial center, the funds turnover ratio is on average 11% higher according to Christoffersen and Sarkissian (2011). This increase shows that age and location can be important factors in whether a funds turnover ratio is high and executing a high-volume trading strategy or was using a buy and hold strategy causing a lower turnover ratio.

Previous research analyzing the trading patterns of ETFs from March 2007 to December 2009 finds that small trades account for 80% of daily ETF turnover, as well as 50% of daily ETF trading volume. These are large portions, clearly illustrating that small trades are the majority of ETF trades. Leveraged and leverage inverse ETFs also had a turnover ratio of roughly four to six times higher than those of benchmark ETF according to Li et al. (2012). This suggests that fund managers have found it advantageous to keep trades relatively small when dealing with ETFs, as

well as the fact that there are characteristics in a leveraged ETF that makes it more inducive to turnover than a benchmark ETF.

Impact of Turnover on Performance

Many researchers question whether an increase in a funds turnover ratio in turn means increased returns. In order to further investigate this, researchers look at 3,126 funds across 35 years to determine a relationship between turnover ratio and a fund's performance. A one standard deviation change in turnover was seen to result in a 0.65% per year increase in performance for the typical fund according to Pastor et al. (2016). The relationship between turnover and performance is stronger for those funds that charged higher fees. This indicates that the fund managers that charge more for their services possess more skill when looking for time-varying profit opportunities in the market. The findings of this paper were echoed in a previous study examining stock picking talent. Funds were split into deciles, the highest decile funds having a turnover ratio nearly 10 times higher than those in the lowest decile. The funds that returned the most were found to be those in the top decile. These higher turnover funds outperformed the lowest decile by nearly 2% despite the increased transaction costs according to Wermers (2000).

Researchers Champagne, Karoui, and Patel (2018) analyze the impact of modified turnover on fund performance. The portfolio turnover ratio can explain nearly 70% of modified turnover according to the study, the key differences between the two measures are that modified turnover looks at the rebalancing of weights within a portfolio instead of monetary gains and sell offs. This causes modified turnover to not factor in offsetting trades, while the turnover ratio does. Modified turnover also uses fund flows in its calculations while the standard turnover ratio does not. Fund flows have a significant relationship with the turnover ratio. Looking at 500 ETFs from 2001-2010

previous researchers find that like mutual fund flows, ETF flows decrease with an increase in turnover according to Clifford et al. (2014). A one standard deviation shift in turnover causes a 2.57% change in fund flow.

When examining the impact of modified turnover on returns the funds are analyzed through a univariate analysis. The quintiles are sorted based on modified turnover. When comparing the risk adjusted return of the highest quintile to the lowest quintile, the research found that those funds with a lower modified turnover were performing better. This suggests that having a higher modified turnover is value destroying. These results contradict previous findings relating to turnover and performance, suggesting that different factors between modified turnover and the turnover ratio or discrepancies between the two data sets contribute to the different conclusions.

Hypothesis

Literature discussing actively managed fixed income ETFs is scarce relative to other fields as this investment instrument is only a decade old. Having only been a part of the market since 2008 there has not been ample time for as much research to be put into this field as that of mutual fund bonds or equity ETFs.

Research into mutual funds has found that funds that trade more do indeed return more according to Pastor et al. (2016). A younger fund manager in a major financial center was also found to have the highest turnover ratio relative to other managers, and these funds on average returned more than their lower turnover counterparts according to Christoffersen and Sarkissian (2011). It is logical to hypothesize based on these findings that the same would hold true for the fixed income ETF market. Based on the research that is available the impact of turnover on fixed income ETF performance can be hypothesized as follows:

H_1: Turnover is related to the performance of fixed income ETFs

H_0: Turnover is not related to the performance of fixed income ETFs

In the case of H_1 this would mean that fixed income ETF managers are trading on valuable information as well as identifying profitable opportunities within their portfolios. The actively managed funds with higher turnover ratios would return more than a fund with a lower turnover ratio. In the case of H_0, the fund managers churn of their portfolio would either be value destroying or it would not be the case that funds with a higher turnover ratio returned more than their low turnover counterparts. In this case the returns would not justify the additional fees and expenses that an actively managed fund incurs when running this high turnover fund

Data

The fixed income ETF data that is used in this study was taken from Morningstar, which is one of the most important databases for ETF data. All the funds are US funds in the fixed income sector. The time period of analysis is from January 1st, 2008 until December 31st, 2017. Data for fixed income ETFs prior to 2008 is very scarce, and this paper examines only actively managed fixed income ETFS, which were introduced in 2008 and began to grow during the financial crisis. There are 2,251 United States exchange traded funds available on Morningstar. Within these funds the global category group was narrowed to fixed income and all of the index funds were filtered out. When narrowing the scope of the ETFs to the above criteria and focusing on the years when most data is available (2008-2017), there are 70 total funds that are found.

For these 70 funds within Morningstar the data points for the annual turnover ratio, the annual net expense ratio, the monthly share class net flow, and the monthly returns of these funds

were drawn for the years 2008-2017. When analyzing the impact of turnover on the performance of these funds the size, net flow, and net expenses are important control variables. As turnover rises, expenses do as well. There are more transaction fees for actively managed funds or a fund that has a higher turnover. This is due to the active manager attempting to beat the index and churning the portfolio, accumulating higher expenses to execute the volume of trades. Actively managed funds also often have higher managerial fees associated with a fund. The reputation of a successful manager to often realize returns above their benchmark indices can lead to that manager charging more for their services. A funds size is also related to turnover. When examining a funds turnover compared to its size it can often be seen if a large portion of trading is in a small portion of the portfolio or if the entire portfolio is being churned. Portfolio turnover is measured as the proportion of the total assets under management that have changed, meaning that both large and small funds have comparable turnover ratios.

Methodology

Previous researchers Wermers (2000), as well as Champagne et al. (2018) have used a univariate analysis to examine mutual fund performance and ETF performance respectively. Both papers used decile/quintile analysis with the latter using panel regressions to further analyze their data. In order to analyze this data, a univariate analysis of the funds is conducted.

Included in the portfolio analysis is the Fama and French's (1993) five factor model where:

$$R_{i,t} - R_{f,t} = a_i + B_{i,Mkt}MKTt + B_{i,SMB}SMB_t + B_{i,HML}HML_t + B_{i,Term}Term_t + B_{i,DEF}DEF_t + E_{i,t}$$

In this model MKT, SMB, and HML are the Fama French three factors, Term is the term spead factor that captures interest rate of the funds, and DEF is a default factor that captures default risk

premiums. By applying this model to the portfolio analysis, the five-factor alpha of the portfolios can be found and analyzed against each other.

The placement of the funds within the tertiles is based on the fund's turnover ratio. Funds with a high turnover ratio are in the highest tertile (3) and those with the lowest turnover are in the lowest tertile (1). Within the full data set the funds were separated by investment grade and high yield. By keeping the funds grouped together by their bond category it creates the test with the least variables, as the bonds that are being compared carry the same properties.

The full data set is split into categories of time period one and time period two. The time period one data (2008-2011) was separated from the time period two data in order to determine if the state of the market during the financial crisis caused an impact on the ETFs turnover and subsequent performance. During this time volatility was very high, as well as investor sentiment being very low. These are two crucial variables when examining a funds turnover according to Pastor et al. (2016). When splitting the full data set into the two subsets available information for actively managed high yield ETFs is scarce, due to this the subsets are not further divided into investment grade and high yield.

For each subset of data the portfolio analysis is conducted. The average monthly return of the funds in each group as well as the five factor alphas are the dependent variables that are tested. The differences in these variables between the top tertile (tertile 3) and lowest tertile (tertile 1) are calculated, as well as the *t*-statistic that is associated with the findings.

A panel regression is used to determine the relationship between the independent variable of turnover on the dependent variables of risk adjusted return as well as five factor alpha adjusted return. The equation used is:

$$R - R_f, a_{FiveFactor} = a_i + B_{i,Turnover}{}^{Turnover} + B_{i,Log(Assets)}{}^{Log(Assets)} + B_{i,MonthlyFlow}{}^{MonthlyFlow} + B_{i,Tenure}{}^{Tenure} + B_{i,ExpenseRatio}{}^{ExpenseRatio} + FE$$

Each month for the data set, a regression is run using manager tenure, monthly net assets, annual expense ratio, and monthly net flows as the control variables. The time fixed effect is controlled for, and all data is windorized at the upper and lower 1% levels for the regression analysis. The results for the significance of turnover on both risk adjusted and five factor adjusted returns are calculated, and the t-statistic associated with each relationship is included.

Empirical Analysis

This section presents the main empirical results of the impact of turnover on fixed income ETF performance. Section 6.1 contains the univariate portfolio analysis from 2008-2017 of the entire data set, as well as the portfolio analysis of two subsets containing only data from high yield and investment grade respectively. Section 6.2 is a univariate portfolio analysis discussing the time period one of the data set (2008-2011) and time period two (2012-2017). In Section 6.3 the panel regression results from 2008-2017 are presented for the entire data set, as well as two subsets containing only data from high yield and investment grade respectively.

Portfolio Analysis (2008-2017)

Table 1 Portfolio Analysis.

	[1]	[2]	[3]	[3-1]
Average Monthly Return	0.205	0.250	0.230	0.025
	(1.98)	(2.8)	(3.44)	(0.28)
Five Factor	-0.123	0.018	0.084	0.207**
	(-1.23)	(0.2)	(1.26)	(2.35)

Table 1 reports the results for the portfolio of the entire data set. This table reports fixed income ETF performance sorted by turnover ratio for all funds in the data set across the entire time period. Each month during January 2008 and December 2017 the sample was sorted into three equal weighted portfolios. Columns 1 -3 represent those tertiles, and H-L designating the difference between the highest tertile and the lowest. Average monthly returns within the tertiles, as well as the five-factor alpha are listed, both of these calculations corresponding t-statistics are listed in parentheses. ***, **, and * indicate significance levels at 1%, 5%, and 10% respectively.

Based on average monthly returns, the top tertile generates 23 basis points per month, while the bottom tertile generates 20.5 basis points per month. The difference between these two tertiles is a 2.5 basis point average monthly return, or 30 basis points annually for the high turnover tertile compared to the low turnover tertile. This corresponds to a t-statistic of 0.28 which carries no statistical significance for the relationship between turnover and monthly returns. The five-factor alpha has a 20.7 basis point difference per month between the high turnover tertile and the low turnover tertile. This difference is significant at the 5% level with a t-statistic of 2.35.

Table 2. High Yield and Investment Grade Portfolio Analysis

	High Yield				**Investment Grade**			
	[1]	[2]	[3]	[3-1]	[4]	[5]	[6]	[6-4]
Monthly Return	0.347	0.428	0.262	0.194	0.202	0.244	0.211	0.009
	(1.2)	(2.04)	(0.82)	(0.79)	(1.97)	(2.86)	(3.03)	(0.1)
Five Factor	-0.108	0.035	-0.154	0.119	-0.123	0.011	0.066	0.190**
	(-0.56)	(0.18)	(-0.52)	(0.5)	(-1.23)	(0.13)	(0.95)	(2.23)

Table 2 contains the results of the portfolio analysis focused on high yield ETFs and investment grade ETFs respectively. This table reports fixed income ETF performance sorted by turnover ratio for high yield and investment grade ETFs when separated into separate portfolios. Each month during January 2008 and December 2017 the sample was sorted into three equal weighted portfolios. Only the high yield funds are represented in columns [1] - [3], each column representing one of the tertiles. Column [1] is the lowest turnover tertile, column [3] is the highest turnover tertile. Column [3-1] designating the difference between the highest tertile and the lowest. The investment grade ETFs in the data set are represented in columns [4] – [6], each column representing one of the tertiles. Column [4] is the lowest turnover tertile, column [6] is the highest turnover tertile. Column [6-4] designating the difference between the highest tertile and the lowest. Average monthly returns within each tertile are listed, as well as the five-factor alpha. Both of these calculations corresponding t-statistics are listed in parentheses. ***, **, and * indicate significance levels at 1%, 5%, and 10% respectively.

There is a 19.4 basis point difference in average monthly return between the top tertile and the bottom tertile of the high yield data, and a 0.9 basis point difference in average monthly returns between the high and low tertiles of investment grade ETFs. While there is a larger difference in average returns of the high tertile compared to the low tertile, neither of these figures are statistically significant. In the investment grade subset there is a 19 basis point difference per month between the five factor alphas of the high and low tertile. This has a t-statistic of 2.23 which is statistically significant at the 5% level.

Across all tertiles in the high yield subset as compared to the investment grade subset the average monthly returns are higher for the high yield funds. The difference between the highest

tertile and lowest tertile is larger for the high yield funds subset as compared to the investment grade funds subset. No calculations in the high yield subset were found to be statistically significant. The investment grade portfolio results show that the five-factor alpha of the high tertile relative to the lowest tertile is significant at the 5% level with a t-statistic of 2.23. This suggests that in the high turnover tertile the alpha of those funds can be expected to be higher than those of the low tertile In general, the results of the univariate portfolio analysis show that turnover is not statistically significant with higher average monthly returns from January 2008 to December 2017, although, the relationship between having a higher turnover and having a higher five-factor alpha is significant at the 5% level.

Portfolio Analysis Time Period One vs. Time Period Two

Table 3 has results of the portfolio analysis conducted on the time period one subset as well as the time period two subset. This table reports the panel regression results of turnover on fixed income ETF average monthly returns over the sample period of January 2008 to December 2017. The dependent variables are risk-free return represented by column 1 and adjusted return represented by column 2. The independent variable is turnover (tr). Fixed income ETF characteristics that are included as control variables are the logarithm of monthly total net assets (logmtna), monthly net flow (mflow), manager tenure (tenure), and expense ratio (exp). The time fix effect is controlled for and all data is windsorized at the upper and lower 1% levels. All corresponding t-statistics are listed in parentheses. ***, **, and * indicate significance levels at 1%, 5%, and 10% respectively.

Table 3. Regression of Turnover on Portfolio Returns (2007-2018)

	[1]	[2]
Intercept	0.669**	0.235
	(2.33)	(0.81)
tr	-0.004	-0.003
	(-0.40)	(-0.30)
logmtna	-0.019	-0.028**
	(-1.51)	(-2.19)
mflow	0.418***	0.420***
	(3.12)	(3.08)
tenure	-0.013	0.003
	(-0.26)	(0.06)
exp	7.370**	7.179*
	(1.96)	(1.88)
R^2	0.351	0.221
Adjusted R^2	0.310	0.172
Number of Observation	1898	1898

The time period one subset uses data from January 2008 until December 2011 a univariate portfolio analysis is conducted to determine the relationship between turnover the performance of fixed income ETFs. During this time there is a 4.4 basis point difference between the high tertile and the low tertile. This is not enough to carry a t-statistic that shows that it is statistically significant. The five-factor alpha of the time period one time period subset has a 33.4 difference in basis points from the high turnover tertile to the low turnover tertile. This large difference has a t-statistic of 1.89, which is statistically significant at the 5% level.

From 2012 until 2017, after the time period one had passed, the data was put into a subset to focus on the market after having recovered from the crisis. Table 3 has results of the portfolio analysis conducted on the fixed income ETFs during that time frame. In the analysis the highest tertile has an average monthly return roughly 1 basis point above that of the lowest tertile, this

difference is not statistically significant. The five-factor model alpha for the portfolio has a 6.3 basis point difference between the high and low tertiles, although this difference is not statistically significant either.

Both during the time period one and after it had passed funds that traded more returned marginally more than those that did not, although, this average monthly return of the high turnover tertile compared to the low turnover tertile although did not have a statistically significant difference. This result states that during both time periods the changes in monthly return cannot be contributed to turnover at any level, and the differences are due to other portfolio characteristics. The five-factor alpha during the time period one (2008-2017) is the only calculation between the high turnover tertile and low turnover tertile that had a statistical significance at the 5% level.

The time period two subset had significantly lower average monthly returns across all tertiles than that of the time period one subset. This is most likely due to increased volatility during this time that creates more profitable opportunities for active fund managers to take advantage of. When the markets began to fall a skilled active fund manager would mitigate the risk, as well as identified opportunities in the market as it recovered and began to realize gains again over the course of the data set. In the time period two subset, the markets had readjusted. The opportunities for the active fund managers to beat the market became more scarce and average monthly return across all tertiles are lower.

Panel Regression Results 2008-2017

In Table 3 the panel regression results for the entire data set are found. Consistent with the portfolio analysis there is no statistical significance of the impact of turnover on risk-free returns or adjusted returns. The panel regression results for turnover show a -0.004 basis point

risk-free return and a -0.003 basis point adjusted return. The t-statistics of -0.4 and -0.3 for adjusted return carry no statistical significance. This shows that the differences in returns found in the data set are attributable to other various fund characteristics. In this test those characteristics are the control variables monthly net assets, manager tenure, net monthly fund flows, and the expense ratios. In the results the control variable monthly net flow shows to be the most significant. The t-statistics of 3.12 and 3.08 for risk-free returns and adjusted returns respectively are both statistically significant at the 1% level.

Table 4. Panel Regression High Yield vs. Investment Grade

	High Yield		Investment Grade	
	[1]	[2]	[3]	[4]
Intercept	2.627	1.564	0.683**	0.236
	(1.05)	(0.69)	(2.47)	(0.84)
tr	0.279	-0.193	-0.003	-0.003
	(0.31)	(-0.24)	(-0.37)	(-0.31)
logmtna	-0.275**	-0.247**	-0.020	-0.028**
	(-2.05)	(-2.02)	(-1.62)	(-2.21)
mflow	0.491	-0.028	0.329**	0.330**
	(0.93)	(-0.06)	(2.46)	(2.43)
tenure	1.268*	0.870	-0.010	0.001
	(1.83)	(1.38)	(-0.21)	(0.02)
exp	95.916	122.780	6.499*	6.144
	(0.86)	(1.21)	(1.75)	(1.63)
R^2	0.836	0.717	0.355	0.221
Adjusted R^2	0.678	0.445	0.310	0.167
Number of Observation	156	156	1742	1742

Table 4 reports the results of the regression analysis on high yield and investment grade funds separately. This table reports the panel regression results of turnover on fixed income ETF average monthly returns over the sample period of January 2008 to December 2011 as compared to January 2012 to December 2017. These time frames allow to distinctly evaluate the Time period

one and Time period two ETF markets. The dependent variables are risk-free return represented by column 1 and adjusted return represented by column 2 for the time period one and columns 3 and 4 respectively for the Time period two time period. The dependent variable is turnover (tr). Fixed income ETF characteristics that are included as control variables are the logarithm of monthly total net assets (logmtna), monthly net flow (mflow), manager tenure (tenure), and expense ratio (exp). The time fix effect is controlled for and all data is windsorized at the upper and lower 1% levels. All corresponding t-statistics are listed in parentheses. ***, **, and * indicate significance levels at 1%, 5%, and 10% respectively.

The high yield results show no statistical significance of the impact of turnover on returns. The risk-free returns for the high yield subset are higher than the risk-free returns in the full data set; although, the adjusted returns are lower in the high yield results than the full data set results. This widening in the range of returns shows that the high yield ETFs that are analyzed are much more sensitive to the adjustments. Neither result is statistically significant however, meaning both the positive and negative results are attributable to other portfolio characteristics. Contrary from the results of the full data set, the high yield funds show no significance between monthly net flows and returns. Instead, the variable with the most significance in this test was monthly net assets, which was significant at the 5% level for both risk-free and adjusted returns.

The results from the regression of turnover on the monthly returns of investment grade ETFs yields no significant results. The results show a slightly negative risk-free and adjusted monthly return of -0.003 basis points attributable to turnover, however both of these carry a t-statistic below any level of significance. This suggests that the differences in turnover within the sample are attributable to other characteristics, in the investment grade data subset the most

significant variable was monthly net flow, consistent with the full data set. For both the risk-free returns and adjusted returns the monthly net flow variable is significant at the 5% level, with t-statistics of 2.46 and 2.43 respectively.

In the full data set as well as the high yield and investment grade data sets independently there is no significant impact of turnover on returns. For all regression results the only variable that was consistently significant is monthly net assets. The results for this variable are significant at the 5% level on the adjusted returns for all regressions. For the adjusted returns of both the high yield and investment grade funds the results are negative, however with no statistical significance to either finding these results can vary significantly due to a change in the control statistics.

Panel Regression Time Period One vs. Time Period Two

The results of the panel regression analysis for the Time period one as well as Time period two are in Table 5. This table reports the panel regression results of turnover on fixed income ETF average monthly returns over the sample period of January 2008 to December 2011 as compared to January 2012 to December 2017. These time frames allow to distinctly evaluate the Time period one and Time period two ETF markets. The dependent variables are risk-free return represented by column 1 and adjusted return represented by column 2 for the time period one and columns 3 and 4 respectively for the Time period two time period. The dependent variable is turnover (tr). Fixed income ETF characteristics that are included as control variables are the logarithm of monthly total net assets (logmtna), monthly net flow (mflow), manager tenure (tenure), and expense ratio (exp). The time fix effect is controlled for and all data is windsorized at the upper and lower 1% levels. All corresponding t-statistics are listed in parentheses. ***, **, and * indicate significance levels at 1%, 5%, and 10% respectively.

During the years 2008-2011 the data set showed no statistical significance between turnover and returns. Both risk-free returns and adjusted returns exhibit a slightly negative relationship with turnover. Neither is found to have any statistical significance, suggesting that this relationship may range to a null relationship depending on control factors. During the Time period one time period none of the control variables are found to have any statistical significance with the dataset. This may be due to the much lower number of observations during this time period as compared to the Time period two time period.

Table 5. Panel Regression Time Period One vs. Time Period Two

	Time period one		Time period two	
	[1]	[2]	[3]	[4]
Intercept	-0.085	0.819	0.802***	-0.094
	(-0.07)	(0.72)	(2.72)	(-0.32)
tr	-0.018	-0.048	-0.006	-0.008
	(-0.31)	(-0.83)	(-0.70)	(-0.90)
logmtna	0.000	-0.036	-0.024*	-0.019
	(0.00)	(-0.61)	(-1.82)	(-1.43)
mflow	0.166	-0.041	0.483***	0.473***
	(0.38)	(-0.10)	(3.42)	(3.35)
tenure	0.183	0.275	-0.084	-0.079
	(1.07)	(1.63)	(-1.55)	(-1.45)
exp	3.139	2.369	18.183***	18.256***
	(0.46)	(0.36)	(2.89)	(2.90)
R^2	0.317	0.275	0.358	0.207
Adjusted R^2	0.114	0.060	0.333	0.175
Number of Observation	228	228	1670	1670

The years 2011-2017 represent the Time period two time period for the panel regression analysis. The results for this subset are in Table 5. In this case, consistent with the Time period one regression analysis, turnover exhibits a slightly negative relationship on returns. This

relationship is not found to be statistically significant however, with a t-statistic of -0.7 for risk-free returns and -0.9 for adjusted returns. Monthly net flow and expenses show a statistically significant relationship at the 1% level with t-statistics of 3.35 and 2.9 respectively for adjusted returns. During this time period the variable of monthly total net assets was also found to be significant at the 10% level for risk-free returns with a t-statistic of -1.82. The relationship between size and adjusted returns does not have any statistical significance, as the t-statistic fell out of the range of the t-spread indicating that after adjustment the relationship between size and returns for the dataset was diminished.

In both time periods of the regression analysis there is no statistically significant relationship between turnover and risk-free returns nor adjusted returns. For both time periods there was a slightly negative relationship between turnover and returns, but with t-statistics that fall outside of the significant t-spread these relationships can be attributed to the influence of other variables.

Conclusion

Previous studies into the impact of turnover on the performance of mutual funds shown that a fund that trades more will have a better performance. Researchers such as Pastor et al. (2016) find that when a fund has a higher turnover ratio it does indeed have higher returns. The relationship between funds with higher expenses was even stronger, suggesting that the fund managers that charge more for their services are better equipped to identify profitable opportunities in the market.

Wermers (2000) finds the same relationship when examining mutual funds. In this study funds in the highest decile of turnover were shown to have an adjusted return of 2.57% above those in the lowest decile. These high turnover funds had on average a turnover ratio that is 10 times higher

than those in the low decile of turnover. This suggests that the churning of a portfolio is in reaction to valuable information and strategically done in order to maximize the returns.

Both studies relate to mutual funds, and this paper applies similar methods in determining if the same relationship applies to turnover and fixed income ETFs. After using a univariate portfolio analysis to determine the relationship between the performance of fixed income ETFs, as well as a panel regression analysis, the impact of turnover on returns does not agree with these studies.

The portfolio analysis results yield no significant relationship between turnover and monthly returns. In all cases, the high turnover tertile of funds returned more than the low tertile, but in no case was this relationship shown to be statistically significant. This suggests that while these funds return more in this data set, the relationship may be due to other variables within the funds that in a different data set would cause a different relationship.

The five-factor alpha of the highest turnover tertile was higher than that of the low turnover tertile for the entire data set as well as in the investment grade and time period one time period subsets. This suggests that in these datasets have an excess return compared to the market. Analyzing all 70 funds across the 2008-2017 time period the high tertile funds outperformed the market by 0.207% per month more than those in the low turnover tertile. This is statistically significant at the 5% level, suggesting that funds are churning their portfolio in order to beat the market and succeeding.

The relationship between turnover and having an excess return above the market is even stronger in the time period one time period. This is due to the market falling many basis points during this time and experienced and skilled managers having the opportunity to churn their portfolio in order to minimize the damage. The fixed income ETFs in this study beat the market

by 0.334% per month during this time period. This suggests that the managers have the ability and skill to mitigate a down market and outperform it as this relationship is significant at the 1% level.

The panel regression analysis shows no statistical significance between returns (risk-free or adjusted) and turnover. It is shown that there is a slightly negative relationship, for all 70 funds from 2008-2017 there was a -0.003% adjusted return per month. With no statistical significance however, this can be attributed to the control variables and in a different data set the results may vary.

The results of the paper lead to the failure to reject the null hypothesis, drawing the conclusion that turnover is not related to fixed income ETF performance. The funds in some cases are shown to outperform the market more when it has a higher turnover ratio, but this is mostly due to the fact that the lowest tertile funds underperformed the market. The high turnover funds did manage to outperform the market, but their higher returns are not due to turnover itself. The regression analysis proved this further by showing to significant relationship between turnover and monthly returns.

Further research to extend these findings could be done by examining passively managed and actively managed fixed income ETFs to determine if the turnover created by the active manager is value creating or destroying. This paper focuses solely on actively managed funds as these have more turnover and allow for greater differentiation between funds. This further study would help determine if turnover is more important for one type of ETF as compared to another and expand on the importance that turnover has in the fixed income ETF market.

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