TITLE

Performance aspects of Greek bond mutual funds

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Abstract

This paper examines the performance characteristics of Greek bond funds and the impact of fund flows on portfolio returns. The evidence shows that on average bond funds do not offer risk-adjusted profits exceeding the returns of the benchmark index, consistent with the US and international evidence. Returns before fees are slightly superior to the returns of the benchmark index, but when fees are considered they lag considerably. The security selection and market timing skills of fund managers are also tested using both an unconditional and a conditional model to test for the impact of public information variables. We also find that fund flows impact negatively on market timing.

JEL Classification: G15, G23

Keywords: performance evaluation, bond funds, conditional model, fund flow
1. Introduction

It is indubitable that the dramatic advance of portfolio evaluation techniques, which involves as its primary evolution the replacement of gross returns calculations by detailed explorations of risk and return and the sources of each, has compelled investment organizations to incorporate evaluation as an integral part in any decision-making process. Performance evaluation literature concerning active funds has been widely addressed worldwide and the majority of studies confirm the inability of active funds to outperform market benchmarks. Among the major studies exploring the performance evaluation literature we find articles by Cumby and Glen (1990), Malkiel (1995), Gruber (1996), Blake and Timmerman (1998), Sawicki and Ong (2000).

The Greek performance evaluation literature is relatively small and is basically limited to studies on equity mutual funds (Milonas, 1999; Artikis, 2002). The same applies for the international performance evaluation literature since most studies analyze either the equity funds market or diversified funds that invest both on equities and non-equities securities. It is therefore surprising that bond funds performance has received almost no coverage especially given the fact that they comprise 1/3 of the funds invested on mutual funds in the Greek market. The total value of funds invested in this category of investments based on the latest data offered by the Association of Greek Institutional Investors is in excess of 6 billion euros and represents 5% of Greek GDP.

This study attempts to fill the gap in the evaluation literature and provides useful insights both for investments professionals in Greece and abroad since the Greek market has recently been classified amongst the developed markets. This evolvement
has led to the significant increase of funds invested in Greece and Greek 10 year bond returns have experienced a significant decrease in yield summing up to just 30 basis points above the corresponding German bonds that are used as benchmark.

Most studies evaluating the performance of bond mutual funds examine the U.S. market and their common conclusion is that bond funds do not outperform passive benchmarks (Blake et al., 1993; Elton et al., 1995). Detzler (1999) investigates the returns characteristics of global bond portfolios using various benchmarks and finds that no abnormal returns are observed. Other studies take up the issue of the difference between high-grade and low-grade funds (Cornell and Green, 1991) but conclude that no significant performance differences are found. In contrast Blume and Keim (1987) and Blume et al. (1991) find that indeed lower grade bond portfolios earn significantly higher returns than higher grade bond portfolios.

In order to evaluate the returns structure of bond mutual funds in Greece both an unconditional and a conditional method is used. Most studies on performance measurement use the unconditional approach even though as Ferson and Schadt (1996) point out this may lead to biases due to common time variation in managed fund risks and risk premia. Few studies worldwide have utilized the conditional method and none have applied it to bond funds. In this respect this study offers a unique approach examining the Greek market with both methodologies, offering thus more robust results. The conditional model in addition to the benchmark index incorporates public information variables namely treasury note yield, term structure of interest rates, the Athens Stock Exchange (ASE) returns as a measure of economic activity and a dummy variable for the month of January.
In this study we also estimate the impact of fund flows on the performance of Greek bond funds. The limited studies concerning the impact of fund flows conclude that exogenous fund flow shocks have a negative impact on performance (Edelen, 1999). Edelen goes further stating that in performance measurement of open-end funds liquidity driven trading adversely affects market timing and security selection. The negative market timing elements according to Edelen are attributed to liquidity motivated trading where fund managers are eager to invest the inflows of funds. Such phenomena are more evident at periods of extreme market volatility. Other studies concerning flow include Warther (1995), Ferson and Schadt (1996) and Edelen and Warner (1998). In this study we attempt to interpret the impact of flows on performance both using traditional performance methods and based on publicly available information.

The rest of this paper is organized as follows. Section 2 explains the methodology used in measuring investment performance for Greek bond funds. In Section 3 the data used in the analysis are outlined, while Section 4 analyses the empirical results. Comments on the implications of the findings are given in the Conclusion.

2 Methodology

2.1 Performance Measurement – Unconditional Measures

The traditional literature on performance evaluation has been based on the work by Jensen (1968) where the abnormal excess return on funds is estimated by alpha, which is calculated by regressing the returns of the fund in excess of the risk-free rate on the
returns of the market portfolio in excess of the risk-free rate. Jensen’s model is outlined as follows:

\[ R_f = \alpha_f + \beta_f R_m + \epsilon_f \]  \hspace{1cm} (2.1)

where

- \( R_f \) is the return of the active fund in excess of the risk-free rate
- \( \alpha_f \) is the excess return coefficient of the active fund during the examination period
- \( \beta_f \) measures the sensitivity of the fund returns relative to the benchmark portfolio used
- \( R_m \) is the return of the market portfolio in excess of the risk-free rate
- \( \epsilon_f \) is the residual term

Treynor and Mazuy (1968) extended Jensen’s work by proposing the use of a quadratic term measuring the market timing element of fund managers’ behaviour. They suggested that when markets are expected to grow fund managers are likely to invest more heavily on the market portfolio of risky assets. On the contrary they are expected to hold a smaller proportion of the market portfolio assets when they expect markets to fall. Therefore Treynor and Mazuy try to capture both market timing and security selection elements in fund managers’ behaviour. Where the coefficient \( \gamma \) is significantly positive market timing elements are present. Their model is the following:

\[ R_f = \alpha_f + \beta_f R_m + \gamma_f R_m^2 + \epsilon_f \]  \hspace{1cm} (2.2)
where

$\gamma_f$ measures the market timing elements

### 2.2 Performance Measurement – Conditional Measures

Initially Ferson and Schadt (1996) proposed the use of public information variables to extend the unconditional performance evaluation methods to conditional performance evaluation methods that cater for the changes in risk over time. Indeed in other studies as well it is found that when unconditional methods are used for performance evaluation negative alphas are found more often whereas when a conditional method is used results are different (Becker, Ferson, Mayers & Schill, 1999). Using the conditional approach the predictive ability of publicly available information is utilised and potential biases incorporated in unconditional methods are bypassed. Fund managers are usually able to identify such market anomalies as noted from public information variables and when these are exploited they may be granted for superior results.

In order to account for the publicly known variables included in the conditional model to the traditional performance evaluation model a vector of lagged public information variables is added. The calculation of the model involves the multiplication of the market return variable with each of the lagged public information variables first.

\[
R_f = \alpha_f + \beta_f R_m + \delta_f (R_{m,t-1}) + \epsilon_f
\]

where
\( \alpha_j \) measures the risk-adjusted performance

\( \delta_j \) measures the coefficients of the lagged public information variables

\( P_{t-1} \) is the vector containing the public information variables lagged for one period

There have been a number of empirical studies concerning the public information variables that should be used in conditional models. These studies have primarily relied on the analysis of equity funds but their findings could be extended to bond funds as well. Chen, Roll and Ross (1986) and Fama and French (1993) initially investigated factors that influence stock returns. Elton et al. (1995) emphasised that actually the same factors that are used to explain stock returns should be used on non-equity funds analysis as well. Ferson and Schadt (1996) propose the use of the following lagged public information variables for the measurement of the conditional alpha for mutual funds – treasury note yield, term structure of interest rates, dividend yield, a corporate quality yield spread and a dummy variable for the month of January. According to Sawicki and Ong (2000) Australian equity funds returns are analysed but the corporate yield spread is not included as an explanatory factor of fund returns and as a broader measure of economic activity they use both the dividend yield and the stock exchange General Index instead in separate regressions.

In our study only the Athens Stock Exchange returns are used as an explanatory variable, since they are considered as a good proxy for industrial production and corporate profitability and data on the market’s dividend yield were not readily available. Alternative studies regarding the Greek market have utilised alternative indices, instead of the Athens Stock Exchange General Index, arguing that the ASEGI cannot approximate the market portfolio (Artikis, 2003). For the purpose of
introducing an economic conditions variable—a proxy for industrial production, corporate profitability and general economic growth though, the ASEGI is indubitably the best possible measure as referred in other studies as well (Fountas and Segredakis, 2002). Furthermore, unreported analysis that we performed, using as explanatory variables the lagged market returns and the dependent variable lagged returns (Jegadeesh and Titman, 2001), provide not significant results and are not included in the analysis.

Therefore, in (3) we use as public information variables the term structure of interest rates, the Treasury note yield, the Stock Exchange returns and a dummy variable for the month of January. In fact Sawicki and Ong (2000) find that stock exchange returns have stronger explanatory power relative to the dividend yield.

The January anomaly is a pervasive, well-documented anomaly in the financial markets. The anomaly has been acknowledged in stock returns, corporate bond returns and yields, as well as municipal bond returns (Kihn, 1996). A number of studies find supporting evidence of the existence of such an anomaly in the corporate bond market (Chang and Pinegar, 1986; Chang and Huang, 1990; Fama and French, 1993; Maxwell, 1998), underlying its importance in performance measurement. Consequently the inclusion of a dummy variable for January was considered necessary to test for the existence of an analogous anomaly in the Greek bond market.

An additional conditional performance model is estimated to test for market timing adding the squared market returns relative to model (3).

\[
R_f = \alpha_f + \beta_f R_m + \delta_f (R_m P_{t-1}) + \gamma_f R_m^2 + \varepsilon_f
\]  

\( (4) \)
We run the above regressions both on net returns (net of expenses) and gross returns basis. This means that bond mutual funds returns are also calculated including fees that are charged both in entering a bond fund and when the investor liquidates his investment. When expenses are calculated returns are significantly altered and we test on separate regressions the nature of the influence both for the unconditional and conditional models reported above.

2.3 Fund Flows and Performance

An area in the empirical finance literature that has attracted increased coverage in recent years is the effect of fund flows on performance measurement. It is important to analyze this influence so as to be able to predict the nature of changes occurring on funds performance as a result of inflows and outflows, which are very common especially during periods of bull and bear markets. The inclusion of fund flow as an explanatory variable in measuring performance gives better insight to the liquidity service provided to stakeholders of mutual funds. Edelen (1999) finds a negative relationship between fund-flows and performance driven by the fact that fund managers engage in liquidity-motivated trading in periods of increased inflows thus ignoring the market timing element. For this reason market timing coefficients are in most cases negative and insignificant. Warther (1995) and Edelen and Warner (2001) find a positive correlation between market returns and fund flows strengthening the negative market timing effect mentioned previously. These results render clear the inability of either an unconditional or conditional approach that ignores flows to identify the market timing ability of a fund.
An additional question posed by many researchers is why there is a negative covariance between fund betas and market returns (Ferson and Schadt, 1996). This means that fund managers reduce their market betas when they expect market returns to go up and vice versa. The most commonly accepted explanation is that when market returns are expected to rise there is an inflow of funds and managers usually do not invest the incoming funds on time so that portfolio betas fall. The size of the fall in betas is analogous to the size of inflows (Sawicki and Ong, 2000). An alternative explanation cites the possibility of this negative covariance being attributed to differing betas of the underlying assets comprising the fund portfolio (Ferson and Schadt, 1996). In this study we incorporate fund flows as an explanatory variable both for conditional and unconditional models testing for their influence on returns. We include net fund flows meaning that we calculate the difference between actual inflows and outflows thus being able to make inferences of fund flow activity on the managed fund’s returns. During the period under examination bond funds experienced significant differences in the funds under managed thus making our conclusions more robust. In order to estimate net fund flows we calculate the differences in total funds under managed within time intervals t and t-1 adding the appreciation/depreciation of the fund during this period under examination. The sum derives from the following:

\[ N_{ft} = F_{ft} - (F_{ft-1}(1 + R_{ft})) \]  

(2.5)

where

\[ N_{ft} \] represents the net fund flows at period t
\( F_{ft} \) is the total funds under managed at period \( t \)

\( F_{ft-1} \) is the total funds under managed in the previous period

\( R_{ft} \) is the returns achieved from \( t-1 \) to \( t \)

We include the fund flow measurement term scaled by the weekly fund size \((S_f)\) both in the unconditional and conditional models including the market timing term to control for the influence of fund flow on this term. Regressions are modified accordingly as follows:

\[
R_f = \alpha_f + \beta_f R_m + \gamma_f R_m^2 + \lambda_f (S_f) R_m^2 + \epsilon_f
\]  
(2.6)

\[
R_f = \alpha_f + \beta_f R_m + \delta (R_m P_{t-1}) + \gamma_f R_m^2 + \lambda_f (S_f) R_m^2 + \epsilon_f
\]  
(2.7)

3. Data

The empirical analysis uses weekly data from 27 bond mutual funds that operated in the Greek market for the seven-year period 1997-2003. In addition, data for another 15 funds that did not operate throughout the aforementioned period were used to test for the known survivorship bias effect in our data. The large data set spans a period during which interest rates experienced both an upward trend, during the 1997-1998 period, and a downward trend after 1999. In this way we believe that the data set is representative of the changes that occurred in the interest rates market during the last decade. Initially we tested for the four-year period 1999-2002 and empirical findings showed that results were only slightly worse regarding fund managers ability to beat
passive benchmarks. The data were obtained from the Greek Institutional Investors Association.

The market value of assets invested on bond mutual funds on December 2003 was 6 billion euros representing 5% of Greek GDP and 30% of the total of funds invested in mutual funds in Greece. According to fund managers, the most widely used benchmark index to measure bond funds returns is the BONDEX comprising of a portfolio of government and corporate bonds. Fund managers enforce active management strategies to outperform the BONDEX, attempting to improve their performance concerning security selection and market timing. For the inclusion of the public information variables, used in the conditional model, we used the ASE General Index returns, ATHIBOR and EURIBOR interest rates and 10-year Greek Government Bond yields spanning the period from 01/01/1997 to 26/12/2003. The aforementioned data provided by the Bloomberg Professional Database.

The 3-month EURIBOR rate (the interbank borrowing rate in the Euro market) was used as a proxy for the interest rate for the period 5/1/01-26/12/03, since this is likely to approximate the rate faced by wholesale traders in the specific market. In order to form the most accurate representation of the Greek money market, we used the 3-month ATHIBOR for the period before the adaptation of Euro (1/1/97-29/12/00). The bond yield sampling procedure, employed in this study, selects the nearest to 10 year maturity Greek Government bond and thereafter the yield to maturity for the specific bond.

As far as the ASE General Stock index is concerned, we used the logarithmic returns:
\[ r_i = \ln \left( \frac{p_i}{p_{i-1}} \right) \]  

(3.1)

where

\( r_i \) is the weekly return

\( p_i \) is the end of the week price

\( p_{i-1} \) is the lagged end of the week price

because it has been shown that they follow a smoother approximation of the normal distribution (Dacorogna et al, 2001).

All data were selected on a Friday closing prices basis. In the cases where those prices were absent, we substituted them with the previous day’s closing prices. However, some errors are inevitable because of the unavailability of simultaneous quotes for stocks, bonds and interest rates markets, since the closing time of three markets does not coincide. Moreover, the phenomenon of the asynchronous trading of the stocks included in the ASE General Index is reflected on it.

Hence, an entire sequence of 209 weekly values was constructed in this manner.

4. Empirical Results

The summary of results for the sample of bond funds in Greece is presented in Table 1. The 7-year examination period starts from January 1997 to December 2003 and results are reported both before fees and costs are charged by the funds and after these fees are incorporated in the prices. The 27 funds included in the sample represent the total of bond funds operating in the Greek market throughout the examination period.
Therefore results might suffer from survivorship bias since funds that were merged or terminated during the 7-year period under examination are not included. Normally, this renders the results more favourable than would be the case had terminated funds been included. This issue is revisited throughout the paper. Both the unconditional and conditional models are analysed with and without the fund flow influence. The Table includes funds displaying positive and significant, positive but insignificant as well as negative significant and insignificant coefficients. Significance levels are reported at the 95% confidence interval.

Results appear to be significantly different when results are reported before fees and when fees are incorporated in the prices. The alpha coefficient appears to be positive and significant for all but two of the funds when fees are not included but this result is dramatically reversed when fees are included with 17 funds exhibiting significantly negative returns. This is expected since fees appear to reduce significantly any returns achieved from active trading. Therefore, when fees are accounted for the majority of funds do not exhibit superior to the benchmark index risk-adjusted performance. The same conclusion is reached both using the unconditional and the conditional performance measure. The average fees charged by fund managers for individual investors amount to approximately 2 percent including the fees charged when entering the fund and those imposed when liquidating your share in the fund. It should be noted however that 30 percent of the funds in the sample still exhibit positive and significant returns even after fees are accounted for indicating that during the examination period some funds did indeed beat passive benchmarks.

INSERT TABLE 1
As far as the market timing and security selection elements are concerned results verify that when fees are included fund managers on average underperform as a result of security selection. The market timing element however shows that both before and after fees 30 percent of the funds exhibit positive and significant market timing, which is probably the driving force behind the 30 percent of the funds having above normal risk-adjusted returns.

When fund flow is considered, performance estimates do not differ notably. Around half of the funds appear to have negative $\lambda$ coefficients indicating the negative impact of fund flows on performance. On the other hand the other half of the funds exhibit positive coefficients both for the unconditional and conditional models, irrespective of whether costs are included or not. However, the fact that over 70 percent of the $\lambda$ coefficient results are not significant, either positive or negative, indicates that fund flow activity has a relatively limited role in fund performance for the majority of the sample. However, there still exists a small percentage of funds where performance estimates improve when flow is included. In addition, market timing results are almost identical irrespective of the fund flow coefficient.

The overall results signify that the majority of active Greek bond funds do not outperform passive benchmarks consistent with other findings for the American bond market (Blake et al., 1993). However a significant part of the funds included in the sample exhibit positive performance even when fees are considered both using the unconditional and conditional model.
The results from Table 2 indicate that on average bond funds have slightly positive and significant alphas for the unconditional model. Alphas are almost identical when the conditional model is used but results are not significantly different from zero on average. After fees are considered, funds exhibit 1.5 percent underperformance and results are significant both for the unconditional and conditional model. An interesting point is that funds’ alphas appear to improve when a conditional model is used. However, this shift of alphas to the right is not large enough to alter the main conclusion derived from this Table that bond funds, on average, fail to surpass passive benchmarks. Furthermore, this shift is reported in other studies in the bond evaluation literature (Ferson and Schadt, 1996; Beckers et al., 1999) but in our study this shift appears to be even smaller.

Bond funds returns appear to be particularly low especially during the first quartile of the data set which coincides with the period 1997-1999 when the Greek stock market experienced extraordinary growth, while during the same period bond returns were comparatively low, which might explain this notable difference.

INSERT TABLE 2

Unreported diagnostic test results for the regression estimates of Table 2 gave statistically significant results regarding serial correlation above the ten percent significance level for the majority of funds. Results for functional form and heteroskedasticity are significant in approximately 80% of the funds analysed, underlying the robustness of our findings. However, results are not important when normality is considered indicating that the residuals are not normally distributed, a
finding however very common in the evaluation literature. Only 10 percent of the examined funds exhibit significant normality results when the unconditional model is used. Results are almost identical when the conditional model is used. Finally, in analysing the stationarity of all the time series comprising our data set we found that almost all were stationary.

In Table 3 the cross-sectional averages of the coefficients used as conditional variables are presented coupled with the number of funds exhibiting significant results in its case. The conditional variables used are consistent with Sawicki and Ong (2000), with the exception of the dividend yield that is omitted and the ASEGI returns being used instead as a measure of economic conditions. Regression results show that the only significant variable explaining bond fund returns is the ASEGI returns as a measure of the economic conditions prevailing in the Greek economy during the examination period. However, it should be stated that t-stat results prove that even the economic conditions variable is only marginally significant. The same result applies for the sample including fees, as the economic conditions variable is important at the five percent significance level, with t-ratio results being even slightly higher, still though marginally significant. Therefore, the economic conditions variable appears to be a significant explanatory variable for Greek bond fund returns. The economic conditions variable is an important positive determinant of bond fund returns for over half of the sample. This result comes in accordance with the findings of Sawicki and Ong (2000), who document that 48 of equity and balanced funds appear to have positive influence from the Australian Stock Exchange dividend yield.
Coefficients for the term structure of interest rates are positive for both samples, with the results provided for the sample including fees being more robust but still not significant. The Treasury note yield coefficient, however, is marginally negative for the sample without fees and positive for the sample including fees. On the contrary, a negative January coefficient is observed for both samples, results proving again not significant. The fact that empirical tests do not support the existence of a January effect in the results could be due to the fact that Greek bond mutual funds invest primarily on government bonds rather corporate bonds, where this anomaly is well-documented.

INSERT TABLE 3

Results presented so far cover solely funds that operated in the Greek market throughout the sample period. However, in the performance evaluation literature it is stated that the inclusion of non-surviving funds in the sample examining the return characteristics of funds, results in average alphas being reduced. This means that on average the exclusion of non-surviving funds from the sample data causes fund returns to be overstated. In our data sample, 15 additional funds did not operate throughout the seven-year examination period. Interestingly, when these funds are included in our model results are influenced with average alphas being slightly higher for the total sample. Our findings are significant at the 1 percent significance level. We reach the same conclusion when the conditional model results are used. In fact, for the conditional model average alphas are even higher. This result contrasting the findings of Elton et al. (1996) could be attributed to the fact that the majority of these funds did not cease to exist due to poor performance and inability to attract new
investors. The mere reason was that during the period 1997-2000 mergers occurred in the Greek banking sector, where Mutual Fund Management companies, being the subsidiaries of big banking groups, were subsequently merged for economies of scale reasons. Therefore, it is reasonable to expect that the inclusion of these funds did not influence results negatively since in most cases they were performing well compared to the rest of the market.

INSERT TABLE 4

The results are analytically presented in Table 4 where we notice that non-surviving funds are better performers both at the unconditional and conditional level. On the total sample level however results are not significantly altered and the depicted profit opportunities are marginal in any case.

In Table 5 we see how performance is attributed between the market timing and security selection elements of the behaviour of fund managers. When considering the sample without fees on average bond funds deliver positive returns that can be attributed to security selection. We also note a positive market timing element depicted from the significantly positive $\gamma$ coefficient in our sample, even though results are marginally statistically significant. Contrary to previous findings we find therefore that the security selection process does not lessen managers’ ability to choose the right timing for their investments and achieve risk-adjusted excess returns, but as we will later see this result is not supported by all the evidence. For the conditional model, the $\alpha$ coefficient is positive and the $\gamma$ coefficient negative but results are not significant for both the unconditional and the conditional model.
indicating that risk-adjusted excess returns are not achievable through either improved security selection estimates or correct market timing ability on the part of fund managers. On the whole, performance estimates for the conditional model are better as indicated by the Pearson correlation coefficient. This result highlights a known finding in the performance evaluation literature (see Ferson and Schadt, 1996) that documents a negative covariance between fund betas and market returns, which is particularly puzzling since it underlines a tendency for fund managers to reduce (increase) their portfolios average betas when market returns are expected to grow (diminish).

INSERT TABLE 5

When fees are considered both the unconditional and the conditional model results show that returns are significantly negative, indicating negative security selection. Market timing estimates, on the other hand, are positive but insignificant. The Pearson correlation coefficient is found negative and significant for the sample including fees as well. This negative relationship between market timing and security selection, found in all regression analysis results in Table 5 is also documented in other papers in the performance evaluation literature (Henriksson (1984), Coggin et al. (1993)) and underlines the fact that the ability to choose securities correctly does not ensure a positive market timing ability and vice versa.

In an attempt to postulate the reasons that cause fund betas and market returns to be negatively correlated we examine the impact of fund flows on performance as indicated in Table 6. Findings show that for the unconditional model the fund flow
effect is negative and significant, whereas the coefficient measuring the market timing element is positive and also significant. However, the conditional model including flow gives us negative sign for the fund flow coefficient and positive market timing coefficient but results are not significant thus not enabling us to draw any definite conclusions.

INSERT TABLE 6

These results are in line with Edelen (1999) that underlines that the fund flow coefficient should be negative and the corresponding market timing estimate positive if the liquidity component effect is considered of minimal importance in the market timing process. Therefore, we can infer that a negative relationship between fund betas and market returns stems from the eagerness of fund managers to invest inflows irrespective of the correct market timing estimates that would have been conducted had there not been these new money flows. Edelen (1999) indeed documents that decreased market timing estimates are observed when mutual funds have new money flows and vice versa.

5. Conclusion

This paper has examined the ability of active bond mutual funds in Greece to achieve profits above the benchmark index returns. The evidence showed that on average bond funds do not offer risk-adjusted profits exceeding the returns of the benchmark index. This was proved using both an unconditional and a conditional model to test for the return characteristics of bond funds. Even though conditional models provide
marginally improved results the general conclusion that funds do not beat passive benchmarks remains valid. Furthermore, when fees are included in the prices the marginal profits derived before their inclusion vanish completely and funds appear to underperform on average. The obtained results after fees are included are almost identical, irrespective of the model used.

Our results proved not to suffer from survivorship bias since the inclusion of the funds that did not operate throughout the sample period did not affect average alphas negatively probably because these funds seized to exist for reasons beyond bad performance and small clientele, such as mergers.

Results on the impact of security selection and market timing showed that the security selection skills do not necessarily mean that this fund should lack market timing ability. Moreover we attempt to derive the reasons that cause fund betas and market returns to be negatively correlated examining the impact of fund flows on performance, the results showing that this is attributed to the eagerness of fund managers to invest new flows in periods of high inflows.

References


Table 1. Evaluation of Greek bond funds in the 7-Year Period to December 2003

This Table shows the summary results of the sample of bond funds operating in the Greek market throughout the 7-year examination period that exhibit performance estimates significant at the 5 percent significance level. Therefore in each column we observe which funds out of the 27 included in the sample have negative but insignificant, positive but insignificant, negative and significant and positive and significant results. In the first section of the Table, results are reported before fees whereas in the second section of the Table fees are included in the estimated regressions. For equations 2.2 and 2.4 the alpha (\( \alpha \)) and gamma (\( \gamma \)) coefficients reported measure the returns of the bond funds and the market timing ability respectively for the unconditional and the conditional model. The results including the fund flow influence on performance estimates, indicated by lambda (\( \lambda \)), are reported for equations 2.6 and 2.7. Alpha (\( \alpha \)) captures fund managers’ security selection ability, gamma (\( \gamma \)) denotes the market timing ability of managers, while lambda (\( \lambda \)) refers to the fund flow variable effect.

<table>
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<tr>
<th></th>
<th>Unconditional ignoring flow (Eq. 2.2)</th>
<th>Unconditional (including flow) (Eq. 2.6)</th>
<th>Conditional (ignoring flow) (Eq. 2.4)</th>
<th>Conditional (including flow) (Eq. 2.7)</th>
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<td>( \gamma ) 8</td>
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<td><strong>With fees</strong></td>
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<tr>
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<td>Funds in sample</td>
<td>27</td>
<td>27</td>
<td>27</td>
<td>27</td>
</tr>
</tbody>
</table>

** Significant at 0.05
Table 2. Overall risk-adjusted performance of Greek bond funds

This Table provides the average returns for the sample data, alphas being reported in percentage terms. Returns are shown both using the unconditional and the conditional model before and after fees. The examination period is spanned into three quartiles to estimate returns during different periods of the data set. The coefficient beta (β) measures the systematic risk of the funds while R² results report the adjusted R² results.

<table>
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<tr>
<th>Model</th>
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<th>SD α</th>
<th>Min α</th>
<th>Q1 α</th>
<th>Q2 α</th>
<th>Q3 α</th>
<th>Max α</th>
<th>Mean β</th>
<th>Mean R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before fees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unconditional</td>
<td>0.0017</td>
<td>6.4382***</td>
<td>0.0002</td>
<td>0.0005</td>
<td>0.0023</td>
<td>0.0017</td>
<td>0.0014</td>
<td>0.0027</td>
<td>0.4074</td>
<td>0.5539</td>
</tr>
<tr>
<td>Conditional</td>
<td>0.0021</td>
<td>1.2199</td>
<td>0.0003</td>
<td>0.0005</td>
<td>0.0028</td>
<td>0.0020</td>
<td>0.0017</td>
<td>0.0034</td>
<td>0.4435</td>
<td>0.5782</td>
</tr>
<tr>
<td>After fees</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unconditional</td>
<td>-0.0184</td>
<td>-9.3254***</td>
<td>0.0185</td>
<td>-0.0499</td>
<td>-0.0263</td>
<td>-0.0201</td>
<td>0.0017</td>
<td>0.0214</td>
<td>0.4448</td>
<td>0.5382</td>
</tr>
<tr>
<td>Conditional</td>
<td>-0.0199</td>
<td>-6.0352***</td>
<td>0.0182</td>
<td>-0.0474</td>
<td>-0.0292</td>
<td>-0.0185</td>
<td>0.0019</td>
<td>0.0025</td>
<td>0.4580</td>
<td>0.5621</td>
</tr>
</tbody>
</table>

*** Significant at 0.01
Table 3. Cross-sectional averages of the conditional variable coefficients

In this Table the public information variables coefficients are reported and more particularly the results. ‘Economic’ represents the ASE General Index returns, ‘Term’ is the term structure of interest rates, ‘Treasury Note’ is the Treasury note yield while “January” represents the dummy variable coefficient.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before fees</th>
<th>After fees</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Coefficient</td>
<td>t-stat</td>
</tr>
<tr>
<td>Economic</td>
<td>0.0098**</td>
<td>1.7776</td>
</tr>
<tr>
<td>Term</td>
<td>0.0067</td>
<td>0.3211</td>
</tr>
<tr>
<td>Treasury Note</td>
<td>-0.0000</td>
<td>-0.0765</td>
</tr>
<tr>
<td>January</td>
<td>-0.0003</td>
<td>-0.1281</td>
</tr>
</tbody>
</table>

** Significant at 0.05
Table 4. Analysis of the performance of surviving and non-surviving bond funds

This Table presents the results both for funds that survived throughout the examination and for those that did not survive. The reported alphas are given in percentage terms coupled with t-statistic and standard deviation results.

<table>
<thead>
<tr>
<th>Category</th>
<th>No. funds</th>
<th>Mean $\alpha$</th>
<th>t-stat</th>
<th>SD $\alpha$</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unconditional model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-surviving</td>
<td>15</td>
<td>0.0023</td>
<td>4.4981***</td>
<td>0.0014</td>
</tr>
<tr>
<td>Surviving</td>
<td>27</td>
<td>0.0017</td>
<td>6.2086***</td>
<td>0.0003</td>
</tr>
<tr>
<td>Difference</td>
<td>Total</td>
<td>42</td>
<td>0.0018</td>
<td>6.5487***</td>
</tr>
<tr>
<td><strong>Conditional model</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-surviving</td>
<td>15</td>
<td>0.0026</td>
<td>4.7847***</td>
<td>0.0014</td>
</tr>
<tr>
<td>Surviving</td>
<td>27</td>
<td>0.0017</td>
<td>6.2462***</td>
<td>0.0003</td>
</tr>
<tr>
<td>Difference</td>
<td>Total</td>
<td>42</td>
<td>0.0019</td>
<td>5.5651***</td>
</tr>
</tbody>
</table>

*** Significant at 0.01
Table 5. Security Selection and Market Timing performance of Bond funds

The following Table reports the descriptive statistics results without the impact of flows (equations 2.2 and 2.4) and with the impact of flows (equations 6 and 7). The alpha ($\alpha$) coefficient results represents the returns derived through the use of security selection only while the gamma ($\gamma$) coefficient measures returns deriving from market timing. The Pearson correlation coefficient is shown by $\rho$.

<table>
<thead>
<tr>
<th>Model</th>
<th>Mean</th>
<th>t-stat</th>
<th>SD</th>
<th>Min</th>
<th>Q1</th>
<th>Q2</th>
<th>Q3</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unconditional model before fees (ignoring flow)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>0.0003***</td>
<td>5.3257</td>
<td>0.0004</td>
<td>0.0005</td>
<td>0.0010</td>
<td>0.0013</td>
<td>0.0014</td>
<td>0.0019</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>0.0122*</td>
<td>1.7815</td>
<td>0.0167</td>
<td>-0.0067</td>
<td>0.0135</td>
<td>0.0217</td>
<td>0.0114</td>
<td>0.2673</td>
</tr>
<tr>
<td>$\rho(\alpha,\gamma)$</td>
<td>-0.4784***</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conditional model before fees (ignoring flow)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>0.0013</td>
<td>1.4587</td>
<td>0.0003</td>
<td>0.0004</td>
<td>0.0009</td>
<td>0.0011</td>
<td>0.0014</td>
<td>0.0019</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>-0.0036</td>
<td>1.2199</td>
<td>0.0032</td>
<td>-0.0003</td>
<td>-0.0055</td>
<td>0.0042</td>
<td>0.0040</td>
<td>0.073</td>
</tr>
<tr>
<td>$\rho(\alpha,\gamma)$</td>
<td>-0.4514***</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Unconditional model after fees (ignoring flow)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>-0.0017***</td>
<td>-10.9544</td>
<td>0.0155</td>
<td>-0.0587</td>
<td>-0.0274</td>
<td>-0.0142</td>
<td>0.0005</td>
<td>0.0130</td>
</tr>
<tr>
<td>$\gamma$</td>
<td>0.0031</td>
<td>1.3120</td>
<td>0.0485</td>
<td>0.0008</td>
<td>0.0038</td>
<td>0.0047</td>
<td>0.0042</td>
<td>0.2571</td>
</tr>
<tr>
<td>$\rho(\alpha,\gamma)$</td>
<td>-0.3581***</td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Conditional model after fees (ignoring flow)</strong></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\alpha$</td>
<td>-0.0023*</td>
<td>-8.1980</td>
<td>0.0388</td>
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<td>-0.0032</td>
<td>-0.0024</td>
<td>-0.0018</td>
<td>0.0139</td>
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<tr>
<td>$\gamma$</td>
<td>0.0033</td>
<td>1.2770</td>
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<td>0.0032</td>
<td>0.0029</td>
<td>0.0030</td>
<td>0.2057</td>
</tr>
<tr>
<td>$\rho(\alpha,\gamma)$</td>
<td>-0.2671***</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*** Significant at 0.01
* Significant at 0.10
Table 6. Security selection, market timing and fund flow

This Table provides the results for the alpha (\(\alpha\)), gamma (\(\gamma\)) and lambda (\(\lambda\)) coefficients for equations 2.6 and 2.7. Alpha denotes returns in percentage terms, gamma is the market timing element and lambda measures the fund flow effect.

<table>
<thead>
<tr>
<th>Coefficient</th>
<th>Mean</th>
<th>t-stat</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unconditional before fees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.0012***</td>
<td>5.5781</td>
</tr>
<tr>
<td>(\gamma)</td>
<td>0.0430*</td>
<td>1.8547</td>
</tr>
<tr>
<td>(\lambda)</td>
<td>-0.0012***</td>
<td>-4.0489</td>
</tr>
<tr>
<td><strong>Conditional before fees</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(\alpha)</td>
<td>0.0017***</td>
<td>5.5710</td>
</tr>
<tr>
<td>(\gamma)</td>
<td>0.0384</td>
<td>1.3870</td>
</tr>
<tr>
<td>(\lambda)</td>
<td>-0.0131</td>
<td>-0.0516</td>
</tr>
</tbody>
</table>

*** Significant at 0.01
* Significant at 0.10