# A STUDY OF THE PERFORMANCE OF HIGH YIELD BOND FUNDS

by

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## Abstract

An increasing number of mutual funds specializing in high yield, high risk bonds has accompanied the tremendous growth of the "junk bond" market. A number of studies comparing risk-adjusted high yield bond returns with other corporate bond returns have suggested superior performance of high yield bonds. This paper studies the growth of the junk bond market and attempts to compare the performance of junk bond funds with other types of bond funds on the basis of a modified capital asset pricing model.

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# Chapter 1

# Introduction

The high yield, or junk[1], bond market has changed drastically over time. Its history can be divided into three periods:

- Before the 1970's, all high yield bonds outstanding were "fallen angels", i.e., originally issued as investment grade bonds but later downgraded.

- In 1977, investment banks started underwriting original issue junk bonds. This made junk bonds an important financing tool for emerging companies.

- Since 1983, junk bonds have been used to finance leveraged buyouts and other corporate takeovers. This has caused concern in the financial community over hostile takeovers and the role of high yield bonds in the economy.

The value of junk bonds outstanding has increased from $7 billion in 1970 to over $100 billion in 1986. A growing number of mutual funds specializing in junk bonds has accompanied the growth of the high yield segment of the fixed income market. As of early 1985, there were approximately 40 high yield mutual funds. In the early 1970's, before original issue junk bonds were a viable financing tool, there were only two such funds. Fund analyst Michael Lipper, of Lipper Analytical Services, claimed that junk bond funds held $6 million as of September, 1984.[2] This was approximately twice the amount in funds that buy only conservative corporate bonds (with a minimum grade of A). Lipper claims that mutual funds specializing in high yield bonds "far outperformed those that bought U.S.

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[1]High yield bonds are bonds that are rated BB and lower by Standard & Poor's or Baa and lower by Moody's Investors Service.

[2]Robert McGough, High-yield Anxiety, Forbes, September 10, 1984, p. 204.

government bonds or A-rated corporate bonds" over the five and ten year periods ending December 1984. From 1980 through 1984, the total return to investors in U.S. government bond funds, corporate A-rated bond funds and junk bond funds were 68.56%, 72.50 % and 78.91% respectively. The corresponding 10-year total returns were 143.0%, 147.6% and 214.5%.[3]

The future of the high yield market is very uncertain, depending on future legislation, insider trading probes and a potential recession. This uncertainty makes it increasingly important to be able to test the performance of high yield bonds. A model that can describe the returns on junk bonds would help legislators determine whether investors in these bonds, such as pension funds, wealthy individuals and now the large number of individual investors who can invest through mutual funds, are being adequately compensated for the risk involved. This work attempts to apply such a model to eight high yield bond funds and five non-high yield bond funds to 1) compare the performance of the different types of funds, 2) determine whether the model adequately describes the returns on both types of funds, 3) determine some variables that affect high yield bond returns and 4) see how the changing structure of the high yield bond market has affected the returns of junk bond funds.

The remainder of this thesis is divided into five parts. Chapter 2 describes the high yield bond market. Both the changing structure and the future of the market are discussed. Chapter 3 discusses previous research in the area of speculative grade bonds. While most research has shown that junk bonds outperform higher grade bonds on a realized yield basis, some evidence has been to the contrary [15]. Chapter 4 discusses the derivation of the regression model used to study the performance of the mutual funds. Substantial attention has been

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[3]John Curran, Fewer Jitters About Junk Bonds, Fortune, April 29, 1985.

given to the method by which to describe the returns on bonds and bond portfolios. However, most research [13], [28], [20] and [1] has shown that corporate bonds depend on both the equity and government bond markets. Chapter 5 presents my empirical results. I study eight high yield and five non-high yield bond funds. I find that neither high yield nor non-high yield bond funds demonstrate superior risk-adjusted performance during the periods 1973-1976 or 1980-1985. However, for at least one family of funds, the high yield fund exhibits more systematic risk in the 70's and is less dependent on a maturity premium in the 80's. Chapter 6 summarizes the content of my findings and suggests some implications for future fields of research in the high yield bond area.

# Chapter 2

# An Overview of High Yield Bonds

## 2.1 The Changing Structure of the Junk Bond Market

Before the late 1970's, most of the outstanding high yield bonds were "fallen angels", i.e., originally issued as investment grade bonds but later downgraded. The investment community applied the term "junk bonds" to these securities in recognition of the problems encountered by the issuers[4] . Examples of major issuers who have "dropped into" the high yield market and then recovered to gain back investment grade status include Ford Motor, Chrysler and Montgomery Ward.

The first new issues of high yield corporate debt were underwritten by Lehman Brothers early in 1977. Drexel Burnham Lambert later became the leading underwriter of these securities.[5] The new issue junk bonds were very different from the fallen angels. The majority of original issue high yields were from emerging companies who were assigned low ratings because they "lacked a track record"[6]. An investment trade magazine made the following comments defending original issue high yield bonds:

> ...by no means do all the securities brought to market with a rating lower than BB deserve the epithet, junk bonds...Actually, to describe an issue of a newly emerging growth company as a junk bond can be highly misleading...To hang the descriptive, junk bond, on an issue merely

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[4]Statement by G.Chris Andersen; Managing Director Drexel Burnham Lambert Incorporated before the Subcommittee on Domestic Monetary Policy of the Committee on Banking, Finance and Urban Affairs; House of Representatives; May 3, 1985

[5]Report by Congressional Research Service for use of the Subcommittee on Telecommunications, Consumer Protection & Finance of the Committee on Energy and Commerce, US House of Representatives, "The Role of High Yield Bonds in Capital Markets and Corporate Takeovers: Public Policy Implications", December 1985, p. 5

[6]Ibid, p. 7.

> because the issuer hasn't been around long enough to establish an investment grade rating is cavalier at best...[7]

According to Drexel Burnham's estimates, over 85 percent of all United States public corporations, if they were to apply for an agency rating, would be rated below investment grade. These companies, as of April 1985, included "many of this country's most rapidly growing and highly creative enterprises, such as Republic Air, U.S. Home, ARA, Metromedia, Geothermal Resources, John Blair, Peoples Express, Ingersoll, Middle South Energy, Con Ed, etc. It would be unfortunate if such companies were denied access to the lowest cost source of funding available to them."[8].

The emergence of original issue speculative grade bonds helped fuel the growth of the junk bond market. Table 2-I indicates the value of new issue junk bonds issued from 1977 through 1986 and the growing importance of original issues in the high yield market.

As you can see from Table 2-I, while the new issue market had been relatively steady from 1977-1982, the value of new issues has grown tremendously since 1983. This has been caused by junk bonds issued to finance hostile corporate takeovers. Since the first junk bond financing was completed in 1983, the high yield bond market has boomed. Table 2-II indicates the percentages of selected leveraged buyouts (LBOs) from late 1985 through 1986 financed by high yield bonds.

Table 2-III shows First Boston's estimates for the total value of the leveraged buyout market in the past four years. As you can see, the LBO market has grown tremendously since 1983 and junk bonds have helped to finance a large part of this market.

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[7]O'Toole, Ed. "Drexel Burnham: The Street's Fastest Growing Investment Bank. Investment Dealer's Digest, September 11, 1984. p. 14-15.

[8]Op cit., G. Chris Andersen, p. 3.

**Table 2-I:** Historical Increase in Value of High Yield Bonds Outstanding and New Issues of High Yield Bonds

| Year | New Issues $billions | Junk Bonds Outstanding $billions | % Junk O/S Due to New Issues |
|---|---|---|---|
| 1970 | ---- | $6.996 | 0% |
| 1971 | ---- | 6.643 | 0 |
| 1972 | ---- | 7.106 | 0 |
| 1973 | ---- | 8.082 | 0 |
| 1974 | ---- | 11.101 | 0 |
| 1975 | ---- | 7.720 | 0 |
| 1976 | ---- | 8.015 | 0 |
| 1977 | $1.0 | 8.479 | 11.8 |
| 1978 | $1.5 | 9.401 | 16.0 |
| 1979 | $1.2 | 10.675 | 11.2 |
| 1980 | $1.3 | 15.125 | 8.6 |
| 1981 | $1.5 | 17.362 | 8.6 |
| 1982 | $2.5 | 18.536 | 13.5 |
| 1983 | $7.6 | 28.223 | 26.9 |
| 1984 | $14.7 | 41.700 | 35.3 |
| 1985 | $14.6 | N/A | N/A |
| 1986 | $34.2 | 100[9] | 34.2 |

N/A: Not available

Sources: First Boston, 1987 p. 23
Morgan Stanley 1985 p.5

Critics believe that takeovers provide little or no economic benefit and may force liquidations or restructurings of viable companies by "raiders" who reap considerable profit and who leave the companies in weakened and highly leveraged positions. On the other hand, some believe that mergers and acquisitions may provide economic gains in economies of scale, better management and more productive allocation of resources.[11] In reporting on corporate raider T. Boone Pickens' bid for Phillips Petroleum in December 1984, the Wall Street Journal claimed:

[9] approximately

[11] Op cit, Report by Congressional Research Service, p. 1.

**Table 2-II:** The Proportion of High Yield Debt Financing in Selected LBO & Recapitalizations - Pro Forma Capitalization

| | Name | Total Capitalization | % Capitalization by High Yield Debt |
|---|---|---|---|
| 8/85 | Multimedia | 905MM | -- |
| 9/85 | Papercraft | 232 | 36% |
| 11/85 | Mary Kay | 304 | 20 |
| 12/85 | International Controls | 441 | 2 |
| 4/86 | National Gypsum | 1490 | 22 |
| 4/86 | BCI Holdings | 8268 | 23 |
| 4/86 | Eckerd Holdings | 1429 | 19 |
| 5/86 | Dart Drug | 193 | -- |
| 5/86 | FMC Corp. | 1929 | 32 |
| 5/86 | Macy Merger | 4373 | 24 |
| 6/86 | Sheller Globe | 525 | 32 |
| 6/86 | Pacific Lumber | 719 | 11 |
| 9/86 | JSC/MS Holdings | 1226 | 15 |
| 9/86 | First Brands | 840 | 46 |
| 9/86 | Colt Inds. | 1831 | 30 |
| 10/86 | SSI Holdings | 5760 | 17 |
| 10/86 | Owens-Corning | 2625 | 11 |
| 11/86 | Warnaco | 543 | 47 |
| 12/86 | Fruehauf | 2032 | 25 |
| 12/86 | Revco (ANAC) | 1495 | 47 |
| Average | | 23 | |

Source: First Boston, 1987.

**Table 2-III:** The LBO Market Since 1983

| Year | Total Value of LBOs $billions |
|---|---|
| 1983 | $1.37 |
| 1984 | $0.60 |
| 1985 | $1.68 |
| 1986[10] | $3.16 |

[10] through October

> Only a corporate Goliath could have attempted that sort of hostile takeover in days gone by. But in the past year, the acquisition game has changed, thanks to a new takeover tactic: junk financing.[12]

Policy makers have been considering legislation against the use of junk bond financing and corporate takeovers in general. A number of legislators have been concerned over the safety of high yield bonds as investments. Senator William Proxmire stated, "In the event that there is a default on some of these junk bonds in the future, a number of our Nation's financial institutions may be adversely affected. I am particularly concerned about stories of problem savings and loan associations having invested in these bonds..."[13]. Other legislators have proposed a temporary moratorium on hostile takeovers financed with high yield bonds, and a ban on federally insured institutions holding junk bonds. Other bills extend this prohibition to pension funds.

### 2.2 Future of the High Yield Market

1985 and 1986 were difficult years for the high yield bond market for several reasons. In March, 1985, Sharon Steel Corporation failed to make interest payments on $426 billion in CCC-rated debentures, representing the first large junk bond default. LTV went bankrupt in July 1986, marking one of the largest defaults on junk bonds in history. First Boston's High Yield Index showed a negative total return in July, reflecting the LTV bankruptcy. Arbitrageur Ivan Boesky was found guilty of insider trading in November 1986, in the most thorough SEC investigation of insider trading to date. Drexel Burnham Lambert was rumored to be the target of an SEC probe, both in its ties to Ivan Boesky and its entire junk bond operation.

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[12]Williams, John D. Takeover Tactics: How 'Junk Financings' Aid Corporate Raiders in Hostile Acquisitions. Wall Street Journal, December 6, 1984, p. 1.

[13]Proxmire, William - Corporate Productivity Act of 1985. Congressional Record, Daily Edition, v. 131, March 20, 1985.

However, demand for junk bonds remained strong enough for Drexel to underwrite $1.5 billion in new high yield debt (including $1 billion for Safeway Stores) in the three day period surrounding Boesky's arrest. Whether the widening insider trading scandal will have long range effects on the high yield bond market remains to be seen.

Many of the incentives that fueled the takeover boom in 1985-1986 will be gone in the next few years. Specifically, some takeover completions were hastened in 1986 to avoid the increase in capital gains tax at the end of the year. Since the capital gains tax has already been increased, this incentive is gone. Also, the Reagan administration has been "disinclined to invoke antitrust laws[14]." With a new administration about to take over, this incentive might also disappear. These factors, along with the possibility of regulations on junk bonds, make the future of the high yield market very uncertain.

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[14]"Wall Street's Junkies are Hooked on Takeovers", The Economist, November 15, 1986

# Chapter 3

# High Yield Bond Research

The grandfather study in the area of high yield bond research is the "Hickman report" (Hickman, 1958). Hickman showed that low quality bonds outperformed high quality bonds on a risk-adjusted basis when the bonds were compared on the basis of realized yields. Hickman showed that the higher promised returns required from low quality bonds at their offering proved to be more than sufficient to compensate investors for the higher default rates incurred in the period 1900 through 1943.

Hickman also found that the market tends to undervalue corporate bonds at or near the date of default. Returns to investors who purchased at default and held until the issue was extinguished were substantial, averaging 17% for public utilities, 19% for railroads and 26% for industrials, while losses to investors who purchased at offering and sold at default were also substantial.

Atkinson (1967) updated Hickman's results for the period 1945 through 1960. He found that the incidence of defaulted bonds in this period decreased to 0.1% of total outstanding issues, compared to 1.7% in the period covered by Hickman.

Baskin and Crooch (1968) studied "flat bonds". These are bonds selling without accrued interest, including both income and defaulted issues, which by nature have uncertain future cash flows and "can be considered speculative."[15] They found that there was a high degree of correlation between the historical rates of return on flat bonds and those earned on common stocks during the years from

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[15]E.F. Baskin and G.M. Crooch, Historical Rates of Return on Flat Bonds, Financial Analysts Journal, November-December 1968.

1950 through 1964. They concluded that whatever factors affect rates of returns on flat bonds must also affect the rates of returns on common stocks. Also, flat bond rates of return were lower than rates of return on common stocks until 1960. From 1961-1964, flat bonds outperformed common stocks, probably due to the severe depression suffered by the railroad industry from 1957 through 1961.

Fitzpatrick and Severiens (1978) confirmed Hickman's findings of superior performance of low-grade bonds in the period 1965 through 1975. This period covers both economic recessions and expansions. Their sample included 117 bonds rated B and BB irrespective of maturities, and omitted bonds in regulated industries (e.g., railroads, airlines, utilities and pipeline companies). The composite junk bond yield was adjusted for the annualized default rate. Their results show that, in almost every year, the composite risk-adjusted junk bond yield provided higher yields than higher-quality bonds. The yield differential between the rating classes expanded during periods of economic uncertainty (recessions of 1969-1970 and 1973-1974) more than during periods of liquidity crises (1966 and 1969). Most defaults took place after the worst of the economic crisis was over, i.e., defaults tended to come during the recovery.

Altman and Nammacher (1985) further confirmed the finding of superior performance of high yield bonds over long term government bonds, in the 15 years from 1970-1984. This period includes the recessions of 1974-1975 and 1981-1982. $3.6 billion of straight debt defaulted and $5.3 billion of total debt defaulted. The default rate on straight low-rated debt ranged from .155% in 1981 to 4.488% in 1977, with the average annual rate being 1.6% of par value. Altman and Nammacher showed that holding a market basket of straight high yield bonds versus holding the equivalent of Shearson Lehman's Long-Term Government Bond Index from January 1978 through January 1984 would have resulted in an annual

compound return spread of over 580 basis points in favor of the high yield bond portfolio; however, this spread was very sensitive to starting and ending dates.

Ma and Weed (1986) compared the yields-to-maturity on a sample of 47 junk bonds issued for mergers with the yields on 47 corporate junk bonds issued for other purposes between March 1980 and September 1985. The study found that the yield-to-maturity of takeover junk bonds moved closely with that of non-takeover junk bonds during the period. The yield on takeover bonds, on average, was lower than that of other junk bonds by less than 50 basis points; however, this difference was not statistically significant. The results of this study imply that investors in takeover junk bonds are not investing in lower yielding instruments than non-takeover junk bonds and that takeover junk bonds are not considered more risky by the market.

Chandy and Cherry (1983) studied realized yields of junk bonds and investment grade bonds during periods of rising, stable and falling interest rates. They found that the realized yields on investment grade bonds exceeded their promised yields in all three types of market conditions. However, the realized yields on junk bonds fell below their promised yields in periods of rising interest rates. They concluded that the default potential in junk bonds received more consideration in investor decisions during periods of rising interest rates than during other periods. The yield volatility was greatest for all bonds during periods of rising rates. Under all market conditions, the yield volatility was greater for junk bonds than for investment grade bonds. Chandy and Cherry then identified variables whose movements are closely associated with movements in realized yields on junk bonds. All variables tested (specifically, coupon rate, yield spread, price, change in promised yield, promised yield at beginning of period, Standard & Poor's 500 stock index, promised yield on Aa corporate bonds, maturity and rating) were found to be correlated with the movements in the realized yield on junk bonds.

Contrary to this result, Stock and Schrems (1984) found lower grade issues to be less volatile than investment grade issues. Stock and Schrems claimed that yield volatility is reduced because of the inverse relationship between credit risk and cyclical variations in interest rates. Because of the dependence of risk aversion on the business cycle, they claimed lower grade issues are less volatile than investment grade issues, in price and in realized monthly returns.

Joehnk and Nielsen (1975) found that the promised yield behavior of low grade issues favor investing in junk bonds. However, on a realized yield basis, with an investment horizon less than the term to maturity, in a stable interest rate environment, the speculative issues were desirable when comparing non-risk adjusted returns. They were not necessarily desirable when comparing risk adjusted returns. In addition, in a volatile interest rate environment, the rewards were even lower. Therefore, they found junk bonds to be inferior on a risk-adjusted realized yield basis.

The major academic studies discussed above in the area of speculative bonds have focused on comparing yields on lower quality bonds with yields on higher quality bonds. The research presented in this paper attempts to quantify the relative performance of high yield bonds on the basis of a modified capital asset pricing model in the following chapter.

# Chapter 4

# Performance Measurements for Bonds and Bond Portfolios

Several studies [1], [28] and [20] have acknowledged the dependence of corporate debt on the equity market. The general approach for many of these studies has been to apply the capital asset pricing model (CAPM) of Sharpe (1964) and Lintner (1965) to the bond market. The CAPM describes the expected return on an asset as:

$$E(R_i)=R_f+\beta_i(E(R_m-R_f)) \tag{4.1}$$

$E(R_i)$ = expected return on security i

$R_f$ = return on a riskless asset

$E(R_m)$ = expected return on the market

$\beta_i$ = correlation between returns on security i and the market

In empirical studies using the CAPM, regression analysis is used to estimate the beta in the equation. Often, Standard & Poor's Composite Index of 500 Stocks is used as the market index and the return on a 30-day treasury bill is used as the riskfree rate $R_f$.

Friend, Westerfield and Granite (1978) constructed an overall market return index for testing the capital asset pricing model with corporate bond returns. This index used the New York Stock Exchange Composite index to cover all common stocks, the Rodney L. White Center for Financial Research index to cover all bonds other than U.S. Governments and a U.S. Government bond index to cover long term marketable U.S. government issues. The weights of the indices used to create this composite index were determined by using annual Federal Reserve Flow of Funds

data on the market value of stocks and bonds held in the United States. The findings were inconsistent with the Sharpe-Lintner theory when either stock returns or bond returns are used as the independent variables. In addition, the tests demonstrated significantly different relationships for stocks and bonds. Specifically, the risk-return relationships for bonds implied a lower risk-free rate of return than for stocks. Surprisingly, the risk-free rate for bonds was closer to the actual risk-free rate of return for the period, implying that the CAPM better explained the returns on the bonds than on the stocks.

Alexander (1980) applied the capital asset pricing model to measure the performance of long-term corporate bonds. Specifically, Alexander used a stock index, a composite index and a debt index in three separate regressions and found that the strongest relationship existed between bond returns and the debt index, and the weakest relationship existed between bond returns and the stock index. However, significant serial correlation occurred when using the debt index.

Weinstein (1981) demonstrated that the systematic risk of corporate bonds is related to the interest rate and default risk to which the bondholder is exposed, where the default risk is measured by the bonds' ratings. This is contrary to those results reported by Reilly and Joehnk (1976) who found no relationship between the systematic risk and the ratings for a sample of utility and industrial bonds. However, as noted by Weinstein, a reason for this difference in findings is that Weinstein included bonds with ratings of Ba and B and below (high yield-junk bonds), while Reilly and Joehnk excluded subinvestment grade bonds from their sample. While Weinstein's results showed little significance between ratings and risk at the higher grade classes, the lower grade ratings showed the greatest correlation with systematic risk, as expected.

The above findings seem to suggest that returns on corporate bonds are not

well described by the one-period capital asset pricing model. Merton (1974) claimed that the value of corporate debt depends on three items: (1) the required rate of return on riskless default-free debt, (2) the provisions and restrictions contained in the indenture (e.g. maturity date, coupon rate, call terms, etc.) and (3) the probability that the firm will be unable to satisfy some or all of the indenture requirements (i.e., the probability of default). Merton demonstrated that corporate debt can be modeled by a derivation of the Black and Scholes (1973) option pricing model and that at any point in time, one can duplicate the returns of corporate debt with some combination of risk-free debt and equity in the issuing firm. More precisely, if the term structure of interest rates is known, the value of the firm's debt and equity will be perfectly correlated with changes in the firm's value. Although the proof of this claim is beyond the scope of this paper, it follows from the possible intertemporal effects (Merton 1973) not captured in the one-period CAPM model.

One model of the returns on a portfolio which takes into account intertemporal effects and the dependence of corporate debt on firm value was described by Fuhrman (1978):

$$R_{pt} = \alpha + (1-\beta-\gamma)R_{ft} + \beta R_{mt} + \gamma R_{lt} + \epsilon \qquad (4.2)$$

$R_{pt}$ = the return on a portfolio in month t

$R_{lt}$ = the return on a long-term default free government bond in month t

$R_{ft}$ = the return on a riskless asset in month t

$R_{mt}$ = the return on the market portfolio in month t

$\alpha$, $\beta$, $\gamma$ and $\epsilon$ are to be estimated from regression

The introduction of this long-term bond captures possible effects due to interest rate exposures. Fuhrman used this regression on nine different mutual

funds, studying returns in the months between June 1973 and May 1976. He found that the returns on the portfolios depend on both the returns on the market and the returns on the long-term default free government bond, as specified in the above equation. This is the regression equation I have used in my research.

# Chapter 5

# Empirical Study

## 5.1 Hypotheses

Following the development described in the previous section, I use regression equation (4.2) in my analysis:

$$(R_{pt}-R_{ft})=\alpha+\beta(R_{mt}-R_{ft})+\gamma(R_{lt}-R_{ft})+\epsilon \quad (5.1)$$

1. Given the claims by Hickman (1957), Atkins (1968), etc. I test the hypothesis that the high yield bond funds would demonstrate superior performance.

$$\alpha_{\text{hy funds}}>0 \quad (5.2)$$

where $\alpha_{\text{hy funds}} = \hat{\alpha}$ when equation (5.1) is estimated for high yield funds.

2. Since high yield bonds are riskier than non-high yield bonds and the correlation between returns on a security and returns on the market portfolio measures systematic risk in the capital asset pricing model, I test whether the regression coefficient of the equity risk premium is greater with high yield bond funds than non-high yield bond funds.

$$\beta_{\text{hy funds}}>\beta_{\text{non-hy funds}} \quad (5.3)$$

where $\beta_{\text{hy funds}}$ and $\beta_{\text{non-hy funds}} = \hat{\beta}$ when equation (4.2) is estimated for high yield and non-high yield funds respectively.

3. I test whether the regression coefficient of the maturity risk premium (premium of returns on long-term government bonds over risk-free rate) is greater for non-high yield bond funds than high yield bond funds. To illustrate this, in the case of a long-term bond with no default risk, the regression coefficient of the maturity risk premium would be 1 (i.e., the bond is being regressed upon itself).

Once default risk is introduced, as in the case of junk bonds, we would expect the correlation of the bond's returns with the returns on the default-free bond to decrease.

$$\gamma_{\text{hy funds}} < \gamma_{\text{non-hy funds}} \tag{5.4}$$

where $\gamma_{\text{hy funds}}$ and $\gamma_{\text{non-hy funds}} = \hat{\gamma}$ when equation (4.2) is estimated for high yield and non-high yield funds respectively.

4. I test the hypothesis that high yield bonds behave as if they are equity (i.e., the regression model collapses to the capital asset pricing model).

$$\gamma_{\text{hy funds}} = 0 \tag{5.5}$$

**5.2 Data**

Monthly data for risk free returns, equity risk premiums and maturity risk premiums are obtained from the Ibbotson-Sinquefeld database. The high yield funds selected are CIGNA High Yield Fund (CIG), Dean Witter High Yield Securities (DWR), High Yield Securities (HY), Kemper High Yield Fund (KEMP), Keystone Discount Bond Fund B-4 (KB-4), Lord Abbett Bond-Debenture Fund (LAB), Oppenheimer High Yield Fund (OPP) and Vanguard Fixed Income Fund (VAN). Descriptions of the high yield funds appear in Appendix A. The non-high yield funds chosen include Delchester Bond Fund (DEL), Keystone Conservative Bond Fund B-1 (KB-1), Keystone Investment Grade Bond Fund B-2 (KB-2), National Bond Fund (NATL), and United Bond Fund (UNI). Descriptions of the non-high yield funds appear in Appendix B. Monthly data for fund net asset values, dividends and capital gains paid out was obtained from Wiesenberger's Current Performance and Dividend Record.

Returns on the mutual funds are calculated as follows:

$$R_{pt} = (NAV_t + CG_t + DIV_t - NAV_{t-1})/NAV_{t-1} \tag{5.6}$$

where: $NAV_t$ = net asset value of fund at beginning of month t

$NAV_{t-1}$ = net asset value of fund at beginning of month t-1

$CG_t$ = capital gains paid out in month t

$DIV_t$ = dividends paid out in month t

Two different time periods are used. Group A includes months from June 1973 to May 1976 for the seven funds for which data were available. Group B includes months from November 1980 to December 1985 for all of the funds with the following exceptions: 1) I could not obtain the data for May 1985, therefore, May and June 1985 (since returns in June cannot be computed without May data) are omitted for all regressions and 2) I could not obtain the data for Vanguard Fixed Income-High Yield Fund in April 1985 and June 1984. Therefore, Vanguard's results do not include June 1984, July 1984, April 1985, May 1985 or June 1985.

The period November 1980 to December 1985 was chosen since the data were available for all of the high yield mutual funds. The data for June 1973 to May 1976 were available for all the non high yield mutual funds as well as two of the high yield mutual funds. I attempt to replicate Fuhrman's results on seven funds in the 1973 - 1976 period. Also, I compare the results in this period to those in the later period. Aside from replication, the comparison between the two periods is interesting because of changes in the high yield market, as described in Chapter 2.

It should be noted that my regression results for the 1973-1976 period are not identical to Fuhrman's results. The significance of all parameters agree with Fuhrman's results except for the $\beta$ on the Delchester bond fund, which I find to be insignificantly different from zero. This could be due to different treatment or calculation of dividends and capital gains paid out, or to different precise starting and end periods used.

**5.3 Results**

Table 5-I shows the intercepts ($\alpha$'s) and the corresponding t-statistics for the periods from June 1973 through May 1976 and from November 1980 through December 1985. All tests of significance are calculated at the 5% level. For the period June 1973 through May 1976, the intercepts of the non-high yield funds are slightly negative while the intercepts of the high yield funds are positive. Almost all intercepts in the period from November 1980 through December 1985 are positive. However, none of the intercepts in either period are significantly different from zero. This result does not allow us to claim that high yield bonds have abnormal risk-adjusted returns ($\alpha_{hy} > 0$).

Table 5-II shows the $\beta$'s and the corresponding t-statistics for the periods June 1973 through May 1976 and November 1980 through December 1985. The estimated beta coefficients confirm previous evidence that the market related risks involved in holding bond portfolios are indeed significant. From 1973 through 1976, estimated betas for the two high yield funds as well as four of the five non-high yield funds are significantly different from zero. From 1980 through 1985, seven of the eight high yield funds as well as three of the five non-high yield bond funds have betas significantly different from zero. The average beta for the high yield funds is greater than the average beta on the non high yield funds in both time periods studied.

Table 5-III shows the regression coefficients on the maturity risk premium ($\gamma$'s) and the corresponding t-statistics for the periods from June 1973 through May 1976 and from November 1980 through December 1985. During the period from 1973 through 1976, the gammas on one of the two high yield funds as well as four of the five non-high yield funds are significantly different from zero. From 1980

**Table 5-I:** Estimated Abnormal Returns on Bond Funds:
Intercept from Regression Model (5.1)

I. High Yield Funds (t-statistics in parentheses)

| Fund | 6/73-5/76<br>36obs/fund | 11/80-12/85<br>60obs/fund |
|---|---|---|
| CIG | --- | .00152<br>(0.700) |
| DWR | --- | .00092<br>(0.4300) |
| HY | --- | .00104<br>(0.501) |
| KB-4 | .00237<br>(0.568) | .00149<br>(0.985) |
| LAB | .00511<br>(1.330) | .00055<br>(0.326) |
| KEMP | --- | .00301<br>(1.490) |
| OPP | --- | -.00041<br>(-0.189) |
| VAN | --- | .00185<br>(0.646) |

II. Non-High Yield Funds

| | | |
|---|---|---|
| DEL | -.00025<br>(-0.097) | .00410<br>(0.414) |
| KB-1 | -.00148<br>(-0.808) | .00028<br>(0.193) |
| KB-2 | -.00249<br>(-0.797) | .00053<br>(0.196) |
| NATL | -.00201<br>(-0.611) | .00018<br>(0.107) |
| UNI | -.00201<br>(-0.978) | .00160<br>(1.270) |

Note: Sample size for VAN (1980-1985) = 57 observations.

* = significant at 5% level. Note that none of the t-statistics in this table are significant at 5% level.

through 1985, the gammas on all the high yield funds along with the gammas on four of the five non-high yield funds are significantly different from zero. Since

**Table 5-II:** Estimated Systematic Risk on Bond Funds:
$\beta$ from Regression Model (5.1)

I. High Yield Funds (t-statistics in parentheses)

| Fund | 6/73-5/76<br>36obs/fund | 11/80-12/85<br>60obs/fund |
|---|---|---|
| CIG | --- | 0.168<br>(2.901)* |
| DWR | --- | 0.200<br>(3.510)* |
| HY | --- | 0.231<br>(4.152)* |
| KEMP | --- | 0.134<br>(2.478)* |
| KB-4 | 0.299<br>(4.152)* | 0.196<br>(4.851)* |
| LAB | 0.465<br>(7.019)* | 0.314<br>(6.925)* |
| OPP | --- | 0.199<br>(3.450)* |
| VAN | --- | 0.129<br>(1.689)* |
| Avg $\beta$ | .382 | .206 |

II. Non-High Yield Funds

| | | |
|---|---|---|
| DEL | 0.170<br>(3.900)* | 0.295<br>(1.115) |
| KB-1 | 0.390<br>(1.230) | 0.096<br>(2.489)* |
| KB-2 | 0.141<br>(2.618)* | 0.221<br>(3.035)* |
| NATL | 0.335<br>(5.927)* | 0.108<br>(2.395)* |
| UNI | 0.142<br>(4.024)* | 0.065<br>(1.944) |
| Avg $\beta$ | .197 | .142 |

Notes:Sample size for VAN (1980-1985) = 57 observations.
* = significant at 5% level.
Averages exclude values insignificantly different from 0

bonds with a greater chance of default have a naturally shorter time horizon, as

expected, the average $\gamma$ for the high yield funds is less than the average $\gamma$ on the non- high yield funds for both time periods studied.

The $R^2$ values for the estimated regressions for equation (4.2) are presented in Table 5-IV. The regression model with only two regressors, market returns and long term government bond returns, explains a substantial proportion of the variation in returns for most mutual funds. The median $R^2$ is approximately 65%.

A test of the significance of the difference in the coefficients between the high yield and non-high yield funds, (specifically, $\beta$ and $\gamma$), is suggested by the higher average beta for the high yield funds and the lower average gamma for the non-high yield funds. I run the following regression:

$$R_{pt}-R_{ft}=\alpha_0+\beta_0(R_{mt}-R_{ft})+\gamma_0(R_{lt}-R_{ft})+\alpha_1 D_a+ \beta_1 D_b(R_{mt}-R_{ft})+\gamma_1 D_g(R_{lt}-R_{ft})+\epsilon \quad (5.7)$$

where $R_{ft}$, $R_{mt}$, $R_{lt}$, $R_{pt}$ are the same as in previous regressions

$\alpha_0$, $\beta_0$, $\gamma_0$, $\alpha_1$, $\beta_1$, $\gamma_1$ are coefficients to be determined by regression

and $D_a$, $D_b$, $D_g$ are dummy variables that take on the value 0 if the fund is a non-high yield fund and take on the value 1 if the fund is a high yield fund.

This regression is run by stacking the Keystone B-1, Keystone B-2 and Keystone B-4 funds. These funds were chosen since I had hoped that by picking funds in the same family (whose stated goals are high quality, medium quality and low quality respectively) some of the errors involved in such statistical analyses of funds are eliminated. Specifically, should an unexpectedly high performance (e.g. $\alpha > 0$) on a fund result, it could be due to either great performance of the junk (or non-junk) bonds included in the fund or the superior management ability of the fund's manager (since these are actively managed funds). By choosing funds in the same family, I am making the rather crude assumption that the management ability of the funds managers are approximately equal.

**Table 5-III:** Estimated Coefficients on the Maturity Risk Premium on Bond Funds $\gamma$ from Regression Model (5.1)

I. High Yield Funds (t-statistics in parentheses)

| Fund | 6/73-5/76 36obs/fund | 11/80-12/85 60obs/fund |
|---|---|---|
| CIG | --- | 0.466 (7.549)* |
| DWR | --- | 0.435 (7.178)* |
| HY | --- | 0.317 (5.360)* |
| KEMP | --- | 0.464 (8.053)* |
| KB-4 | 0.417 (2.166)* | 0.297 (6.905)* |
| LAB | 0.246 (1.386) | 0.239 (4.957)* |
| OPP | --- | 0.432 (7.046)* |
| VAN | --- | 0.467 (5.652)* |
| Avg $\gamma$ | .417 | .390 |

II. Non-High Yield Funds

| | | |
|---|---|---|
| DEL | 0.520 (4.465)* | 0.215 (0.767) |
| KB-1 | 0.518 (6.115)* | 0.594 (14.473)* |
| KB-2 | 0.498 (3.465)* | 0.368 (4.752)* |
| NATL | 0.256 (1.696) | 0.450 (9.338)* |
| UNI | 0.711 (7.512)* | 0.665 (18.539)* |
| Avg $\gamma$ | .562 | .519 |

Notes:Sample size for VAN (1980-1985) = 57 observations.
*=significant at 5% level.
Averages exclude values insignificantly different from 0

The results of the regression for the two periods are shown in Table 5-V.

**Table 5-IV:** $R^2$ Values for Equation (4.2)

| Fund | 1980-1985 | 1973-1976 |
|---|---|---|
| CIG | .663 | ---- |
| DWR | .667 | ---- |
| HY | .605 | ---- |
| KEMP | .672 | ---- |
| KB-4 | .702 | .468 |
| LAB | .706 | .649 |
| OPP | .659 | ---- |
| VAN | .525 | ---- |
| DEL | .057 | .594 |
| KB-1 | .851 | .585 |
| KB-2 | .509 | .438 |
| NATL | .723 | .587 |
| UNI | .897 | .745 |

NOTE: --- indicates those funds that did not exist in the earlier period.

The resulting coefficients on the dummy variables are very interesting. The intercept is not changed (in the Keystone Family) if the fund was a high yield fund as compared to a non-high yield fund, as evidenced by the statistically insignificant $\alpha_1$'s in both periods. However, the slopes of the funds differ. From the period June 1973 through May 1976, the "dummy coefficient" on the market portfolio is statistically significant, i.e., the high yield fund exhibited higher systematic risk in the 1973-1976 period than the non-high yield funds. However, during this period the sensitivity of the fund to the returns on a long-term default free government bond is essentially unchanged (as evidenced by the statistically insignificant $\gamma$).

The results from the November 1980 through December 1985 are the opposite. While the intercept is still unchanged in this period, the sensitivity of the returns on the funds decreases with regard to the long-term default free government bond (if the fund is a high yield fund) but has essentially remained unchanged in its

**Table 5-V:** Coefficients from Regression Model (5.7) to Test the Difference Between High Yield and Non-High Yield Funds in the Keystone Family

I. June 1973 - May 1976

| | Coefficient | T-Statistic | Significant? |
|---|---|---|---|
| $\alpha_0$ | -.00199 | -0.8850 | NO |
| $\alpha_1$ | .00436 | 1.1216 | NO |
| $\beta_0$ | .08984 | 2.3248 | YES |
| $\beta_1$ | .20880 | 3.1196 | YES |
| $\gamma_0$ | .50796 | 4.9117 | YES |
| $\gamma_1$ | -.09106 | -0.5083 | NO |

$R^2 = .475$

Note: Sample size = 108 observations.
Significance tests done at 5% level.

---

II. November 1980 - December 1985

| | | | |
|---|---|---|---|
| $\alpha_0$ | .00041 | 0.2855 | NO |
| $\alpha_1$ | .00108 | 0.4393 | NO |
| $\beta_0$ | .15840 | 4.1684 | YES |
| $\beta_1$ | .03751 | 0.5698 | NO |
| $\gamma_0$ | .48083 | 1.9002 | YES |
| $\gamma_1$ | -.18431 | -2.6336 | YES |

$R^2 = .664$

Note: Sample size = 180 observations.
Significance tests done at 5% level.

sensitivity to the returns on the market portfolio. Possible explanations for these results are discussed in Chapter 6.

I also run separate regressions with one dummy variable (i.e., a dummy variable for alpha, beta and gamma terms were run separately). These tests

assume that being a high yield fund does not affect the other "non-dummied" variables in the regression. The results of these tests are identical with the results of the above regression. It is important to keep in mind that this regression is only performed on the Keystone family, and the results are not necessarily indicative of the other funds.

I also run the following regression:

$$R_{pt}-R_{ft}=\alpha+\beta_0(R_{mt}-R_{ft})+\beta_{med}D_{med}(R_{mt}-R_{ft})+\beta_{hy}D_{hy}(R_{mt}-R_{ft})+ \gamma_0(R_{mt}-R_{ft})+\gamma_{med}D_{med}(R_{lt}-R_{ft})+\gamma_{hy}D_{hy}(R_{lt}-R_{ft})+\epsilon \quad (5.8)$$

to test the difference between the medium grade fund (Keystone B-2) and the high grade fund (KB-1) and the low grade high yield (KB-4) fund and the high grade fund

where $D_{med}$ = 0 if the fund is not a medium grade fund (Keystone B-1 and Keystone B-4) and 1 if the fund is a medium grade fund (Keystone B-2)

and $D_{hy}$ = 0 if the fund is not a high yield fund (Keystone B-1 and Keystone B-2) and 1 if the fund is a high yield fund (Keystone B-4).

The results are shown in Table 5-VI:

Again, these results are very interesting. Of course, the specific results for the high yield fund are the same as above. However, the results from the dummy variable $D_{med}$ terms are surprising. In the period from June 1973 through May 1976, the medium grade fund is not significantly different from the high grade[16] fund.

In the period from November 1980 through December 1985, while the medium grade Keystone B-2 fund is not significantly different from KB-1 in the fund's sensitivity to the returns on the market portfolio, the medium grade status

[16]A high grade fund is a fund that invest in high quality, low yield bonds

**Table 5-VI:** Coefficients from Regression Model (5.8) to Test the Difference Between High Yield, Medium Yield and Low Yield Funds in the Keystone Family

I. June 1973 - May 1976

| | Value | T-Statistic | Significant? |
|---|---|---|---|
| $\alpha_0$ | -.00053 | -0.2902 | NO |
| $\beta_0$ | .03932 | 0.7181 | NO |
| $\beta_{med}$ | .10202 | 1.3174 | NO |
| $\beta_{hy}$ | .25833 | 3.3360 | YES |
| $\gamma_0$ | .51856 | 3.5385 | YES |
| $\gamma_{med}$ | -.01838 | -0.0887 | NO |
| $\gamma_{hy}$ | -.10448 | -0.5042 | NO |

$R^2 = .472$

Note: Sample size = 108 observations.
Significance tests done at 5% level.

---

II. November 1980 - December 1985

| | | | |
|---|---|---|---|
| $\alpha_0$ | .00076 | 0.6736 | NO |
| $\beta_0$ | .09552 | 1.8146 | NO |
| $\beta_{med}$ | .12492 | 1.6785 | NO |
| $\beta_{hy}$ | .10121 | 1.3599 | NO |
| $\gamma_0$ | .59308 | 10.6107 | YES |
| $\gamma_{med}$ | -.22610 | -2.8633 | YES |
| $\gamma_{hy}$ | -.29495 | -3.7352 | YES |

$R^2 = .679$

Note: Sample size = 180 observations.
Significance tests done at 5% level.

does decrease the fund's sensitivity to returns on the long-term default free government bond.

## 5.4 Model Specification Checks

The Durbin-Watson test statistic is used to detect the presence of first-order serial correlation. The resulting statistics are shown in Table 5-VII. For the period from 1973 through 1976, the null hypothesis that no serial correlation exists cannot be rejected. However, from the period 1980 through 1985, serial correlation does exist for Keystone B-4, Vanguard High Yield Fixed Income and the Delchester Bond Funds. The Durbin-Watson statistic for the Keystone B-2 fund is indeterminate. While the presence of positive serial correlation does not affect the unbiasedness of the regression estimators, it does affect their efficiency.

In order to correct for the presence of serial correlation for the Keystone B-4 High Yield Fund and the Delchester Bond Fund, the Hildreth-Lu procedure is used. The results of this procedure are shown in Table 5-VIII.

The results of the Hildreth-Lu procedure are not qualitatively different from those without correction for serial correlation.

F-tests were performed on the seven funds existing in both time periods to test the hypothesis that the regression error distributions in the two periods are identical. The results showed that with only three of the funds (Keystone B-4 High Yield Bond Fund, the Lord Abbett Bond Debenture Fund and the Delchester Bond Fund) the hypothesis that the returns had the same distribution could not be rejected. The results are shown in Table 5-IX.

**Table 5-VII:** Durbin-Watson Statistics

I. May 1973 - June 1976

High Yield Funds

| Fund | D-W Statistic | Does Serial Correlation Exist? |
|---|---|---|
| KB-4 | 2.119 | NO |
| LAB | 2.410 | NO |

Non-High Yield Funds

| | | |
|---|---|---|
| DEL | 2.045 | NO |
| KB-1 | 2.277 | NO |
| KB-2 | 2.105 | NO |
| NATL | 2.090 | NO |
| UNI | 1.627 | NO |

II. November 1980 - December 1985

High Yield Funds

| Fund | D-W Statistic | Does Serial Correlation Exist? |
|---|---|---|
| CIG | 2.189 | NO |
| DWR | 2.033 | NO |
| HY | 1.834 | NO |
| KEMP | 2.059 | NO |
| KB-4 | 1.432 | YES |
| LAB | 1.838 | NO |
| OPP | 2.208 | NO |
| VAN | 2.588 | YES |

Non-High Yield Funds

| | | |
|---|---|---|
| DEL | 2.891 | YES |
| KB-1 | 2.288 | NO |
| KB-2 | 2.423 | MAYBE |
| NATL | 1.763 | NO |
| UNI | 2.172 | NO |

**Table 5-VIII:** Hildreth-Lu Results: Corrected Coefficients

a. Delchester Bond Fund (November 1980 - December 1985)

| | Value | T-Statistic | Significant? |
|---|---|---|---|
| $\alpha$ | .00500 | 0.4899 | NO |
| $\beta$ | .34512 | 1.2086 | NO |
| $\gamma$ | .18366 | 0.6307 | NO |

$R^2$ = .060

b. Keystone B-4 Fund (November 1980 - December 1985)

| | | | |
|---|---|---|---|
| $\alpha$ | .00180 | 0.8683 | NO |
| $\beta$ | .18861 | 4.9596 | YES |
| $\gamma$ | .29184 | 7.6300 | YES |

$R^2$ = .743

---

**Table 5-IX:** F-tests Pooling 1973-1976 and 1980-1985 Data

| Fund | F-statistic | From the same period? |
|---|---|---|
| | High Yield Funds | |
| KB-4 | 1.740 | YES |
| LAB | 3.322 | YES |
| | Non-High Yield Funds | |
| DEL | 0.130 | YES |
| KB-1 | 6.413 | NO |
| KB-2 | 4.968 | NO |
| NATL | 5.507 | NO |
| UNI | 7.715 | NO |

Note: Sample size = 96 observations.
Significance tests done at 5% level.

# Chapter 6

# Conclusion

## 6.1 Discussion of Results

The model used to describe the returns on a portfolio of bonds was constructed from the riskless asset, the market portfolio and long term default free debt, using returns on a 30-day Treasury bill, Standard & Poor's Composite Index, and a long-term default free government bond, respectively, as proxies. Using this model, certain conclusions can be made about the performance of high yield bonds.

There was no significant indication of superior risk-adjusted performance for either the high yield mutual funds or the non-high yield mutual funds. This was demonstrated by the following results: 1) none of the intercepts ($\alpha$'s) on the bond funds could be found to be significantly different from 0 and 2) the estimated coefficient of a regression using a dummy variable if the fund was a high yield fund also was not significantly different from 0 (for the Keystone family of funds).

The correlation of the returns on the funds with the returns on the market portfolio (as measured by $\beta$) was, on average, higher if the fund was a high yield fund. This suggests that the high yield status of the fund increases the riskiness of the fund, as expected. However, when this conclusion was tested with the Keystone family of funds, while the high yield status of the fund did make the fund riskier in the period from June 1973 through May 1976, there was no evidence that the fund was riskier (in terms of default) from November 1980 through December 1985.

The correlation of the returns on the funds with the returns on the long-term default free government bond (as measured by $\gamma$) was, on average, lower if the fund

was a high yield fund. When this result was further tested with the Keystone family of funds, while the high yield status of the fund did make the fund less sensitive to the long-term bond during the 1980 through 1985 period, it did not during the earlier period. Furthermore, the increased sensitivity of the funds to the market premium and the decreased sensitivity of the fund to the premium on the long-term default free government bond were in the directions expected. My hypotheses were that the high yield status of the fund would make the bonds more dependent on the market and less dependent on the lont-term default free bond-see Chapter 5).

Why did we get different results for the two periods? Although one cannot answer this question with certainty, one possible explanation concerns the relative structure of the high yield bond market during both periods. Recall from chapter 2 that before the 1980's, many of the junk bonds were originally high grade issues that had been downgraded. After 1980, however, the huge leveraged buyout boom was the main driving force behind the high yield bond market. Since the premium of the returns on a long-term default free government bond is, essentially, a maturity risk premium, the investors in bonds would be more sensitive to the maturity risk premium if the bonds are expected to be outstanding for a long period of time. If the bonds are expected to be retired tomorrow, for example, then they will not be priced to reflect interest rates in seven years. Therefore, one explanation for the decreased sensitivity of the premium of the fund to the premium of the long-term default free bond in the 1980's is that for some reason investors expect high yield bonds to remain outstanding for shorter periods of time than in the 1970's.

This is plausible when one considers that usually in leveraged buyouts, the object is to decrease the amount of debt as soon as possible. Many companies try to

repurchase the junk bonds issued to finance a leveraged buyout as soon as possible. Therefore, the investors' time horizons might be shorter if they expect the company to repurchase the bonds. In contrast, the investors of many of the "fallen angel" junk bonds of the 1970's bought the bonds of high grade firms and, therefore, were planning to hold the bonds for a long period of time.

Regression (5.8) with dummy variables for both medium grade bond funds and junk bond funds shows that in the November 1980 through December 1985 period, both medium and high yield bond funds were less sensitive to the long-term default free government bond. During the period from June 1973 through May 1976, only the high yield bond fund exhibited greater sensitivity to the market portfolio. This suggests that for the fund to be "extra-sensitive" to the premium on the market portfolio, the bonds had to be very low quality (since the medium grade status had no effect on the $\beta$). However, in the 1980's, even a fund of slightly worse quality would decrease the sensitivity to the maturity risk premium, i.e., investors had a longer time horizon only with top quality funds.

A similar scenario can be described for the difference in results from the 1970's to the 1980's on the market risk of junk bonds. If the investor had bought the bond of a formerly high grade company which is now a junk issue, obviously something has happened to the firm to make the rating decrease drastically. The investor might then become more sensitive to, as Merton [20] described, the "firm's value." Since the bond has essentially become more sensitive to this value (or default risk), the bond might behave more like equity. Therefore, the sensitivity of the bond to the equity market will increase. My results indicate that in the 1970's, when the junk bonds were "fallen angels", the $\beta$'s of the funds differ. However, investors in junk bonds in the 1980's are usually buying into either original issue junks, or junks issued as part of the company restructuring.

Is it a good assumption that the "1980's junk investor" is less sensitive to default risk than he was in the 1970's? The two largest junk defaults yet have occurred during the past two years. The default by Sharon Steel and the default by LTV shook the high yield market. The data used in this study are not recent enough to include the LTV default, nor did it include the months after the Ivan Boesky insider trading scandal. Several predictions have been that the leveraged buyout boom will lead to many bankruptcies in the next several years. If this proves to be the case, my guess is that investors that are not looking at default risk will be surprised.

### 6.2 Methodological Problems

While the possible conclusions to be drawn from the results of this study are interesting, several caveats should be mentioned.

First, I must stress again that the results of the different sensitivities of the funds to the stock and long-term government bond markets were only for the Keystone family of funds and, therefore, are not necessarily representative of the other funds studied.

Second, the data for this report are for junk bond funds, and not junk bonds. The funds are not necessarily representative of the junk bond market for several reasons. The funds do not have to invest all of their assets in junk bonds (as shown in the description of the funds - Appendix A). Also, the funds are run by different managers. While I did not interview the managers, it is probably safe to assume that while one fund manager could include in his portfolio a representative mix of the junk bond market, another manager could be extremely distrustful of leveraged buyout junk bonds and include none of these in his portfolio. If this were the case

with the Keystone B-4 fund manager, then our scenario seems a little ridiculous. One possible line to follow-up on this study is to find out exactly what the makeup is of normal corporate high yield bonds and leveraged buyout high yield bonds. However, Ma and Weed [17], found that there is not a difference in the two types of junk bonds.

Third, the regression model assumes that the systematic risk and the interest risk are constant over the period. As Fuhrman [13] stated, this is clearly violated since the average maturity of the portfolio and the average riskiness of the bonds are important decision variables. Any actively managed fund will violate these necessary statistical conditions. If we were to know the assets in the fund at all times, we could run a new regression each time the risk level is changed. Alternatively, since risk levels do change over time, it might be wise to make the measurement period short (i.e., daily observations)[17].

### 6.3 Summary

While one should be careful not to generalize the results of this study to the whole junk bond market, in the case of at least one bond family, a junk bond fund exhibited different behavior in the 1980's than it did in the 1970's. I believe that this difference in behavior was caused by the changing junk bond market.

Since, most likely, the structure of the high yield bond market in the future will again be drastically changed because of a great deal of uncertainty in regulations and the economy, it would be very interesting to compare the results of this study with a similar study a decade from now.

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[17]Robert Fuhrman. Performance Measurement for Bond Portfolios, June 1978

# Appendix A
# High Yield Funds - Source: Wiesenberger

## A.1 CIGNA HIGH YIELD FUND, INC.

CIGNA High Yield Fund, formerly INA High Yield Fund, is a diversified open-end management investment company with the primary objective of as high a level of current income from investments in fixed-income securities as is consistent with the assumption of moderate credit risk. investments are largely debt securities in the "B" range of rating by the rating services.

At the end of 1984, the fund had 86.4% of its assets invested in senior securities, of which the substantial proportion was in five industry groups: consumer goods and retail trade (15.5% of assets, entertainment & leisure (11%), transportation (9.8%), communications (9.3%) and utilities (9.1%). By type, the major commitments were in debentures (36.6% of assets), subordinate notes (23.8%) and mortgages (16.5%). The rate of portfolio turnover in the latest fiscal year was 137% of average assets. Unrealized appreciation in the portfolio at the calendar year-end was 0.9% of total net assets.

## A.2 DEAN WITTER HIGH YIELD SECURITIES INC.

The fund is an open-end diversified management investment company that was first offered in September 1979 as InterCapital High Yield Securities. The present name was adopted in March 1983.

The primary investment objective is a high level of current income. Capital appreciation is a secondary objective but only when this does not interfere with the

pursuit of high income. Investments consist principally of fixed income securities which are rated in the lower categories by established rating services or issues nonrated, but of comparable quality.

At the end of 1984, the fund had 91.3% of assets in corporate debt securities, of which a substantial proportion was in five industry groups: health care (12.8% of assets), electric utilities (11.5%), entertainment, gaming & lodging (11%), transportation (9.6%), and diversified manufacturers (8%). Debentures represented 82.9% of assets and convertible issues accounted for 8.4%. The rate of portfolio turnover during the latest fiscal year was 121% of average assets. Unrealized depreciation amounted to 4.9% of calendar year-end assets.

## A.3 HIGH YIELD SECURITIES, INC.

High Yield Securities was organized in July 1977 and shares were first publicly offered in September of the same year. The fund's objective is primarily the highest level of current income in fixed income securities not believed to involve undue risk. Securities offering the high yields sought are ordinarily in the lower rating categories or are unrated. Capital growth will also be considered, but only when consistent with the primary objective of high current income.

At the close of 1984, the fund had 92% of its assets in bonds and preferred stocks. Principal holdings were debentures (79% of assets), convertible debentures (8%), and convertible preferred stocks (5%). Over half of the assets were concentrated in five industry groups: multiple industry (18% of assets), domestic oil(13%), retail sales (9%), broadcasting & publishing (6%) and leisure time (5%). The rate of portfolio turnover during the latest year was 48,6% of assets. Unrealized depreciation amounted to 7,7% of year-end assets.

## A.4 KEMPER HIGH YIELD FUND, INC.

The fund invests primarily in corporate bonds and other debt securities with the primary objective of providing the highest level of current income with capital gains as a secondary objective. The high yield securities sought by the fund will ordinarily be in the lower rating categories of the established rating services or will be unrated.

At the end of 1984, the fund had 91.8% of its assets in senior securities, of which the sizeable proportion was in five industry groups: utilities (12.1% of assets), finance & insurance (11%), communications & media (10.9%), oil & gas (10.8%) and leisure time (8%). Non-convertible corporate obligations, at 86.3%, was the major portfolio component. The rate of portfolio turnover in the latest fiscal year was 78% of average assets. Unrealized depreciation in the portfolio at the calendar year-end was 1.6% of total net assets.

## A.5 KEYSTONE DISCOUNT BOND FUND: B-4

Keystone B-4 invests its assets in bonds selected with the objective of securing a generous income return. The portfolio will ordinarily include a substantial representation in bonds which, as a class, sell at discounts from par value. The portfolio may also contain short-term money market instruments, which may seem appropriate to achieve the fund's investment objective.

At the end of the 1984 year, the fund had 93% of its assets in bonds, of which the substantial proportion was in five areas: industrials (36.3% of assets), non-telephone utilities (7.8%), private placements (7.6%), banks & finance (6.9%) and transportation (5.6%). Debentures constituted 25.8% of assets and convertibles were 21%. The rate of portfolio turnover in the latest fiscal year was 36% of

average assets. Unrealized depreciation in the portfolio at the calendar year-end was 6.2% of total net assets.

## A.6 LORD ABBETT BOND-DEBENTURE FUND, INC.

The fund made its initial public offering on March 19, 1971, but shares were not continuously available to the public until May 1, 1972. The investment objective of the fund is to provide a high current income and the opportunity for capital appreciation to produce a high total return through a professionally managed portfolio consisting primarily of convertible or discount debt securities and convertible debentures, many of which are lower rated.

At the end of 1984, the fund had 95.9% of its assets in bonds and preferred stock, of which a sizeable proportion was in five industry groups: utilities (17.9% of assets), oil (10.7%), transportation-airlines and drugs (6.7% each) and steel (5.1%). A breakdown of portfolio composition showed 35.9% of assets in low grade straight debt, 17.9% in low grade convertible debentures, 17.8% in high grade convertible debentures, 11.3% in convertible preferreds and 10.3% in investment grade (AAA-BBB) straight debt. The rate of portfolio turnover in the latest fiscal year was 64.2% of average assets. Unrealized depreciation in the portfolio at the calendar year-end was 7.6% of total net assets.

## A.7 OPPENHEIMER HIGH YIELD FUND, INC.

The fund was incorporated in July 1978 and initially offered its shares in August of the same year. Its primary objective is to earn a high level of current income by investing primarily in a diversified portfolio of high yield fixed-income securities (long-term debt and preferred stock issues, including convertibles)

believed not to involve undue risk. As a secondary objective, the fund seeks capital growth. It may invest up to 10% of its assets in restricted issues and to the same limit may lend its portfolio securities to selected brokers, dealers and other financial institutions. At the end of 1984, the fund had 96.3% of its assets in fixed income securities of which non-convertible issues represented 82.8% of assets and convertibles 10.7%. The five largest industry commitments were utilities (9.8% of assets), airlines (7.9%), financial services (6.9%), leisure (6.8%), and petroleum and natural gas (6.4%). The rate of portfolio turnover during the latest fiscal year was 84.8% of average assets. Unrealized depreciation at the calendar year-end was 8.6% of total net assets.

## A.8 VANGUARD FIXED INCOME SECURITIES FUND - High Yield Bond Portfolio

Vanguard Fixed Income Securities Fund, (formerly Westminster Bond Fund, became a series fund on December 27, 1978 offering two separate portfolios, "Investment Grade" and "High Yield Bond Portfolio." This comprises a diversified portfolio of high yielding medium and lower-quality bonds, with the objective of providing the highest level of current income available without assuming undue risk.

At the end of 1984, the High Yield portfolio had 98% of its assets in bonds, of which a major proportion was in five industry areas: industrials (43.5% of assets), communications & entertainment (13,8%), industrial medical (10.5%), industrial energy (9.3%) and banks & finance (3.4%). The rate of portfolio turnover in the latest fiscal year was 82% of average assets. Unrealized depreciation at the calendar year-end was 0.1% of total net assets.

# Appendix B
# Non-High Yield Mutual Funds - Source: Wiesenberger

## B.1 DELCHESTER BOND FUND

Delchester Bond Fund was organized in May 1970 and its shares initially offered to the public in August of the same year. The present name of the fund was adopted in June 1973.

The primary objective of the fund is "to earn and pay shareholders as liberal a current income as is consistent with providing reasonable safety in the value of their investment." At least 80% of the fund's assets must be invested in bonds, U.S. Government securities and commercial paper, while the balance may be invested in other income-producting securities. At the end of 1984, the fund had 92.1% of its assets in senior securities, of which the major proportion was in industrial issues (66% of assets), electric utility (18%) and financi (8%). Debentures represented 63% of assets; sinking fund bonds were 13%, mortgages and notes were 8% each. The rate of portfolio turnover during the latest fiscal year was 117% of average assets. Unrealized depreciation amounted to 1.3% of calendar year-end assets.

## B.2 KEYSTONE CONSERVATIVE BOND FUND: B-1

Keystone B-1 seeks as high a level of income as is feasible, consistent with preservation of principal, through investing in high and good grade bonds and short-term money-market instruments. It may invest in domestic, foreign and restricted securities.

At the close of 1984, the fund had 76% of its assets in bonds, of which the major proportion was concentrated in five investment areas: non-telephone utilities (24% of assets), U.S. Government issues (16.4%), telephone utilities (13.6%), industrials (13%) and banks & finance (10.5%). Debentures constituted 21.9% of assets, dated bonds were 17.4%, foreign debt issues were 16.4% and convertibles were 10.8%. The rate of portfolio turnover in the latest fiscal year was 72% of average assets. Unrealized appreciation was 2.7% of total net assets at the calendar year-end.

## B.3 KEYSTONE INVESTMENT GRADE BOND FUND: B-2

Keystone B-2 seeks maximum income without undue risk of principal by investing in bonds which are normally characterized by liberal returns and moderate price fluctutations. The portfolio may contain short-term money market instruments. While emphasis is on income, consideration is given to security of principal, marketability and diversification.

At the end of 1984, the fund had 84.3% of its assets in straight bonds, including 11.3% in U.S. Government bonds, of which the major industry commitments were industrials (20% of assets), banks & Finance (10.4%), non-telephone utilities (6.8%) and transportation (5.1%). Foreign bonds constituted 14.7%. The rate of portfolio turnover in the latest fiscal year was 117% of average assets. Unrealized appreciation in the portfolio at the calendar year-end was 1.2% of total net assets.

## B.4 NATIONAL BOND FUND

The objective of National Bond Fund, organized in 1940, is to provide an investment in a diversified group of bonds, including convertible bonds, which are slected for income. The level of interest coverage and the indicated marketability of the bonds are the major qualifications in the selection of issues for the fund's portfolio.

At the end of 1984, the fund had 95% of its assets in corporate bonds, of which the major proportion was in five industry groups: electric utilities (22% of assets), oil & oil services and finance & insurance (12% each), gas pipelines (8%) and retail trade (7%). By types, 70% of holdings were debentures and 23% were first mortgages. The rate of portfolio turnover in the latest fiscal year was 102% of average assets. Unrealized depreciation at the fiscal mid-year on October 31 was 2.2% of total net assets.

## B.5 UNITED BOND FUND

United Bond Fund was initially offered in March 1964 as a medium for investors primarily interested in a portfolio of fixed-dollar securities offering a reasonable return with more emphasis on preservation of capital invested. Only debt securities may be purchased for the portfolio. The fund may lend securities up to 10% of total assets.

At the close of 1984, the fund had 77% of its assets in bonds, of which 48% were industrials, 12.4% in electric utilities, 9% in insurance & finance obligations and 5.2% in communication utilities. Of the 23% in net cash and equivalent, the bulk (16.8% of assets) was in U.S. Government issues. The rate of portfolio turnover in the latest fiscal year was 97.2% of average assets.

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