Statistical and Cognitive Barriers to the Effective Disclosure of Mutual Fund Risk

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I. Introduction

Mutual fund investors were blindsided by a number of high profile catastrophes in 1994. Several government bond funds were rocked by soaring interest rates — Paine Webber was forced to buy $268 million in troubled securities to bail out its Short-Term US. Government Securities Fund, while Piper Jaffray eventually paid $70 million to settle a number of class-action lawsuits arising out of the 28 percent decline in its Institutional Government Income Portfolio. In each case, the losses were tied to investments in illiquid derivative securities. Similar investments also brought about the first incidence of a money-market fund "breaking the buck." Finally, the devaluation of the peso devastated the Latin American sector, underscoring the risks of emerging market funds.

In response, the Securities and Exchange Commission ("SEC") began to investigate methods to better inform investors of the risks they face in specific funds. As part of this initiative, in early 1995 the SEC issued a concept release (hereinafter "Concept Release") requesting comments on improving descriptions of risk in mutual funds. The most controversial aspect of the

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2 Saul Hansell, Piper Jaffray to Settle Suits for $70 Million, N. Y. TIMES, Feb. 16, 1995 at D4.
3 Money-market mutual funds seek to maintain a stable share price, typically $1.00 per share, and generally allow investors to write checks to redeem shares. To accomplish this, money-market funds generally use the amortized-cost method to value their shares, as provided for in Rule 2a-7 of the Investment Company Act. These features are largely responsible for the perception that these funds are in some way "guaranteed" and will not lose money. In 1994, more than a dozen money-market funds suffered portfolio losses, but managers made up for the losses so that investors would not sustain a loss of principal. One fund manager, however, Community Assets Management, could not prop up a fund and was forced to liquidate at a loss, or "break the buck." See Leslie Wayne, Investors Lose Money in "Safe" Fund, THE N. Y. TIMES, Sep. 28, 1994 at D1.
4 See Jerry Morgan, In Emerging Markets, Risks Come With Territory, NEWS DAY, Jan. 8, 1995 at 6.
Concept Release was its focus on certain quantitative risk measurements, such as beta and standard deviation. For the first time, the SEC also solicited the responses of individual investors through a twelve-question survey, as well as an abbreviated form of the survey published in Money magazine. The response to the release was overwhelming; following an extension of the original June 28, 1995 deadline, the SEC received over 3,700 responses.

This paper seeks to highlight the various issues that should be considered by mutual fund regulators in contemplation and construction of a risk disclosure requirement. Regulation by mandated disclosure, as opposed to more intrusive methods such as portfolio restrictions, is appealing because such regulation does not constrain the choices available in the market. To the extent that inadequate information is the cause of a market failure, disclosure of such information solves the problem directly without otherwise disturbing the operation of the market. In the mutual fund context, however, effective disclosure of risk information is quite difficult.

First, measuring risk is a complicated task. Following the issuance of the Concept Release, commentators from the media and the mutual fund industry were quick to point out the multidimensional nature of fund risk. Indeed, most of the public debate over the ideas expressed in the Concept Release has focused on the difficulties of expressing mutual fund risk in a single number. This paper will address these arguments, and present the major difficulties with mathematically summarizing fund risk.

This paper will go further, however, and investigate aspects of risk disclosure that have received much less attention. Risk disclosure is directed primarily toward individual investors; if they are unable to understand or

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6 See Penelope Wang, What You Need To Know About Fund Risk, MONEY, June 1, 1995 at 110.  
7 Daniel S. Levine, Funds Find Changes to Risk Disclosure Risky Business, SAN FRAN. BUS. TIMES, Aug. 25, 1995 at 12.
process the information, the initiative will fail. Policy makers who fashion risk disclosure regulation must understand the prior knowledge and cognitive strategies that their audience utilizes to process information. Many individuals do not have a strong understanding of risk, inflation, and other financial concepts that would allow them to effectively comprehend certain risk information. In general, human beings also have limited abilities to process risk information and tend to behave irrationally when making decisions under conditions of uncertainty. As will be discussed, additional information can sometimes actually lead to worse decisions. Looking to research in marketing and psychology, this paper will explore how risk information is processed, and how that knowledge can be instructive in enhancing the effectiveness of risk disclosure.

Policy makers must consider all these factors before instituting a risk disclosure requirement. Simply disclosing accurate information is only one facet of the problem — a risk disclosure program will only be successful if investors are able to rationally integrate the information into their decision making. The success or failure of regulation must be judged not be the quality of the information disclosed, but instead by positive changes in investor behavior. By considering the ideas discussed in the pages below, mutual fund regulators will have better chance of affecting such a change.
II. Statistical Dilemmas

Following the issuance of the Concept Release, commentators immediately criticized the use of quantitative measures of risk, one method the SEC offered as a potential vehicle of disclosure. The mutual fund industry similarly expressed its disapproval of quantitative risk measures. The focus of this section is on the challenges involved in creating a quantitative risk statistic which encompasses important aspects of mutual fund risks. This section will introduce the principle quantitative measures of risk that were proposed by the SEC and have received the majority of attention from academics and industry professionals, as well other methods based on quantitative data, such as bar graphs. The quantitative measures that are most seriously being considered by the SEC for various contexts are standard deviation, beta, duration, and downside-risk statistics.

Each potential risk measurement must be evaluated from two perspectives. First, a useful statistic must capture the characteristics of risk that are useful to investors. Because quantitative measures of risk are simplified representations of risk, they express only certain aspects of fund risk. Second, there must be a dependable and cost effective way of forecasting a particular statistic. The most common forecasting method is forecasting based on past performance, and most forecasting methods rely on historical data to some extent. Therefore, the problems that arise through the use past performance to measure current risk will be addressed.

Generally, quantitative risk estimators seek to describe all or part of the probability distribution of expected returns. Such a probability distribution

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8 See, e.g., Werner Renberg, No Single Measure Indicates Risks of Equity Fund, FORT LAUDERDALE SUN-SENTINEL, Oct. 30, 1995 at 28; Levine, supra note 7, at 12.
would, for example, provide the chance of returns being between 1% and 2%, 2% and 3%, and so on. Simple definitions of risk attempt to capture certain aspects of this distribution in a single number which can be estimated through various statistical methods.\textsuperscript{10} A significant attribute of a single measure of risk is that it allows investors to compare the risk characteristics of different funds. Any simplified risk measure, however, cannot relay all the aspects of a fund's risk. All risk measures will also require a certain amount of explanation in prospectuses based on their difficulty and generality as indicators of fund risk.

Standard deviation, also known as volatility, gauges the spread of the probability distribution around its average or expected return. Standard deviation is the square root of variance, which is defined as the average squared deviation of each return from its average or expected return. A security whose returns are not likely to depart much from the expected return would have a low standard deviation, and vice versa. For standard deviation to be meaningful, however, one must know the distribution of the returns.\textsuperscript{11} If returns are distributed normally, two-thirds of the time a fund's return will fall within one standard deviation of the expected return, and 95% of the time a fund's return will fall within two standard deviations of the expected return.

Unlike standard deviation, beta is a conditional measure of risk. Beta measures fund return conditional on the return to the market portfolio, generally measured by a broad market index such as the S&P 500 (for equity


\textsuperscript{11} As will be discussed below, this presents a problem with using standard deviation as a measure of fund risk.
Funds with higher betas have greater volatility relative to the market; those with lower betas are less volatile than the market. By definition, the market portfolio has a beta of 1.0. For example, if the S&P 500 gains or loses 10%, a fund with a beta of 1.5 would be expected to gain or lose 15%, respectively. Duration is a conditional risk estimator for bond funds; duration measures expected bond returns conditional on interest rate movements. A longer duration means the value swings more rapidly with interest rate fluctuations.

Both beta and standard deviation have been criticized as incomplete or misleading definitions of mutual fund risk. The criticism of beta as a definition of mutual fund risk centers around beta's dependency on a benchmark. Because beta only captures risk conditional to the market portfolio, it doesn't detect risk that is not market driven. Gold funds generally have betas around zero, because fluctuations in the price of gold are not related to the market. Gold funds, however, are very volatile. Likewise, beta is inappropriate for bond funds, which vary with interest rates. This would prevent investors from comparing the riskiness of stock and bond funds, as well as posing difficult problems for "balanced" or "lifestyle" funds, which contain both stocks and bonds. Academics have also argued that because the "market" includes not only stocks, but also other assets and financial instruments, any index used to measure beta is an imperfect proxy, therefore providing an imperfect estimate of market sensitivity.

13 Sarah Stirlind, SEC Leans Toward Duration as a Way to Better Inform Investors About Funds' Risks, The Bond Buyer, Nov. 29, 1995, at 1. Duration was created to provide a number comparable to the average maturity of the bonds in a fund — longer term bonds are more sensitive to interest rates.
14 For a discussion, see Burton Malkiel, A Random Walk Down Wall Street 254 (1990).
Because standard deviation is an unconditional measure of risk, it is not susceptible to these criticisms. Standard deviation is widely used by institutional investors; Harry Markowitz chose standard deviation as the definition of risk for his seminal work on portfolio analysis. Standard deviation, however, is only useful as a definition of mutual fund risk if returns are distributed symmetrically. Whether investors view risk as risk of loss or as volatility, if returns are symmetric standard deviation is a meaningful characterization of risk. If the distribution is not symmetric, however, standard deviation is an inaccurate measure of risk because it does not account for the greater volatility on one side of the mean. For example, if returns to an instrument or portfolio are "right skewed," most of the volatility is on the up-side; the standard deviation of such an instrument would overstate its riskiness as compared with an instrument of equal volatility with returns that are symmetrically distributed. The returns to certain instruments, such as bonds with prepayment features (namely mortgage-backed instruments), are not normally distributed. The returns to major asset classes, such as large-cap stocks and bonds, also show various degrees of skewness.

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16 Standard deviation would be most useful if returns were distributed normally. As noted above, this would supply investors with the "rule of thumb" that 95% of all returns would fall within two standard deviations.
17 If returns are symmetric, upside volatility mirrors downside volatility. Therefore, a higher standard deviation implies both greater risk of loss and greater volatility.
19 *Ibid*. This is due to the fact that prepayment options will only be exercised if interest rates move in the investors favor.
The utility of standard deviation is also limited because it measures volatility over a specific time horizon. The Concept Release discusses using both monthly and annual returns to calculate standard deviation.\(^21\) The volatility of market returns from both bonds and equities decrease markedly as the time horizon over which volatility is measured is extended.\(^22\) Different investors, however, have different time horizons, and are concerned about volatility over different time periods. If monthly returns are used to compute standard deviation, it will overstate volatility for investors concerned with one-year or five-year volatility. Monthly volatility is a particularly inappropriate risk definition for those individuals saving for retirement, who are concerned with long-term returns.

The choice of time frame can also cause distortions in the estimate of riskiness for certain fund types. Lipper Analytical Services argues that standard deviation calculated using monthly returns overestimates the riskiness of international funds and underestimates the riskiness of high income investments.\(^23\) Because of currency fluctuations, international funds monthly returns tend to be more volatile. Such funds, however, are more diversified and therefore market resistant; international funds declined less than Growth and Growth & Income funds during the down markets of 1987 and 1990.\(^24\) Alternatively, high income investments have an above average

\(^{21}\) See Concept Release, supra note 5, at 11.
\(^{22}\) See IBBOTSON ASSOCIATES, STOCKS, BONDS, BILLS, AND INFLATION 1995 YEARBOOK 43 (1995). The series presents the maximum and minimum values of returns for one, five, ten, fifteen, and twenty year holding periods for six different asset classes such as large company stocks and long-term corporate bonds.
\(^{23}\) Unpublished submission of Lipper Analytical Services (on file at SEC Public Reference Room).
\(^{24}\) Id.
income anchor, stabilizing monthly returns and masking short-term riskiness.\textsuperscript{25}

Finally, because standard deviation measures volatility, not returns, it has been criticized as inappropriate for investors with certain perceptions of risk. Eileen Makoff, associate editor for Morningstar Mutual funds, argues that standard deviation can be misleading for funds that move consistently in one direction.\textsuperscript{26} For example, a fund that loses 5% every month would have a low standard deviation, yet the "risk of losing money" would be very high. Of course, coupled with return data, standard deviation is more meaningful; this is why Makoff suggests that a blend of various statistics be disclosed similar to the format used by Morningstar.

In order for any definition of risk to be useful, however, one must be able to forecast risk in an accurate and dependable fashion. Here, both beta and standard deviation are susceptible to criticism. The simplest and most common way of estimating statistics such as standard deviation and beta is through the use of historical data. The ability to accurately determine the present value of a risk measurement from past data depends on the stability of the risk characteristic, i.e., whether it remains constant over time. Of course, historical estimators would be useless for new funds that lack historical data; this problem aside, however, historical estimation still presents difficulties.\textsuperscript{27}

\textsuperscript{25} Id. Lipper's submission notes that during the two-year period from December 31, 1988 to December 31, 1990 the average High Current Yield fund declined by 10.33%, compared with a 19.91% increase for the average Corporate A Rated bond fund.

\textsuperscript{26} Eileen M. Makoff, \textit{Risk: The Big Picture}, MORNINGSTAR MUTUAL FUNDS, April 28, 1995 at 1. Makoff argues that a combination of risk measures, such as standard deviation, beta and a downside risk measure, would be of most benefit to investors. Makoff analogizes such a disclosure system to the present disclosure system for corporate financial statements, which includes an income statement, balance sheet and statement of cash flows.

\textsuperscript{27} It would seem reasonable that if, for example, historical standard deviation was required to be disclosed, prospectuses for new funds could contain a simple disclaimer warning prospective
The relationship between beta and stock returns, as predicted by the capital asset pricing model ("CAPM"), has been the subject of thorough analysis and discussion by academics, and serious questions still remain as to the validity of the theory. Many of these studies examine the relationship between mutual fund risk and return on a contemporaneous basis. One traditionally accepted notion, however, was that while betas for individual firms were unstable, stability increased with the number of stocks in a portfolio, and therefore the betas of diversified mutual funds were stable. Recent research, however, has challenged this belief. Another recent study examined the predictive power of historical mutual fund betas to explain future returns using a standard formulation of the CAPM, and found that beta was not a significant determinant of monthly mutual fund returns. Thus the utility of historical mutual fund betas has come under serious criticism.

As for standard deviation, Fitch Investors Services analyzed more than 100 bond funds that represented a number of fixed-income categories. For the 10-year period ending in December, 1993, trailing three-year return volatility was compared to return volatility for the subsequent three-year period across all funds. For the funds analyzed, historical standard deviation explained only about 55% of the volatility in the following three year period.

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purchasers of the lack of data. Lack of data could bias investors' perceptions of a fund, however, as will be discussed in Part III, infra.

28 See Malkiel, supra note 14, at 215.


33 Id.
A number of factors affect the stability of historic mutual fund risk measurements. Perhaps most importantly, no measurement based on historic risk can capture changes in investment style. Investment managers that explore new investments create volatility that is not captured by historical measurements. Second, favorable market trends can hide dormant risks. The standard deviation of annualized monthly returns for the Piper Jaffray fund was 3.91% for the three year period ending in December 1993, comparable to 3.88% for the Lehman Brothers General US. Government mutual fund index. The funds 25.80% cumulative loss through September of 1994 exceeded six standard deviations.\textsuperscript{34} Therefore, risk measured by historical standard deviation would not have warned investors of the Piper Jaffray disaster, arguably the event that most significantly influenced the issuance of the Concept Release.

There are other ways of forecasting standard deviations and betas, although all rely on historical data to a certain extent. Portfolio analysis involves looking at each component of the current portfolio to generate a forecast of the funds riskiness. Econometric methods are used to calculate the standard deviations and correlations of all of the portfolios assets. While such methods are still imperfect, they do account for changes in investment style. Such analysis, however, is extremely complicated, prohibitively expensive and involves proprietary technology. Not surprisingly, a number of companies that offer such forecasts to institutional investors argue that their methods should be the chosen by the SEC.\textsuperscript{35}

Thus standard deviation and beta present problems both as measurements of mutual fund risk and due to the difficulty of forecasting them correctly.

\textsuperscript{34} Id. Recall that if returns are normally distributed, 95% of all returns should fall within two standard deviations.

\textsuperscript{35} See, e.g., Kahn.
Arguably the greatest problem with beta, however, is its conditional nature, making it incompatible with certain funds. While standard deviation is unconditional and less complex, it is still incomplete as a measure of risk, and fails to account for some drastic movements. Of course, as stated above, no risk measurement can be expected to account for all aspects of fund risk.

Other measures of fund risk under consideration measure only downside risk, e.g., the risk of losing principal. Such statistics have the attribute of conforming to many investors conceptions of risk (see Part III below). One example is semivariance, which is simply the variance of returns below the mean. If returns are symmetric, the semivariance will equal one-half the variance. Where returns are not symmetric, however, downside statistics such as semivariance can provide a more meaningful description of risks. Unfortunately, such statistics are difficult to forecast and are generally unstable. Indeed, Harry Markowitz preferred semivariance as a measure of investment risk but used variance due to the computational difficulties of working with semivariance. Some present-day investment managers claim to have developed methods to overcome Markowitz's problems, but such technology is too novel and complex for the purposes of mandated risk disclosure.36

Duration differs from standard deviation and beta in a number of ways. First, as a measure of interest rate risk, duration is clearly only applicable to bond funds. Second, duration is not measured by historic price movements, but is instead a summary statistic of the average maturity of cash flows.37

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37 More specifically, duration is the weighted average of the times to each coupon or principal payment made by a fixed-income instrument. The weight applied to each payment is the proportion of the total value of the bond accounted for by the payment. See ZVI BODIE ET. AL., INVESTMENTS 473 (2nd ed. 1993).
This serves as an indicator of interest rate sensitivity, because the price sensitivity of a bond increases with time to maturity. Therefore, the duration of a portfolio gives some indication of its current interest rate sensitivity, but is not a prediction based on past data.

Duration is a limited tool, however. First, duration is an approximate measure of price volatility only; it does not measure total return volatility. The total return to bonds with the same duration but different yields will change by different amounts in response to interest rate swings. Second, while duration is not a predictor based on historical data, it only provides a "snapshot" of sensitivity. Also, calculating the duration for a bond fund is tricky. Because bond mathematics is not linear, a six year duration bond will not exhibit the same sensitivity as a an equally weighted portfolio of two and ten year bonds. Finally, duration obviously does not account for other aspects of bond fund risk, which include prepayment, liquidity, reinvestment and currency risk.

Because of these limitations the mutual fund industry strongly opposes disclosure of duration for bond funds, and a number of companies that offer more comprehensive risk rating services for bond funds have generously offered their services. Duration could be useful in more limited contexts, however. The Investment Company Institute (ICI), for example, recommends that all funds that hold themselves out as having stated maturity policies, i.e. short- or long-term, maintain commensurate durations.

38 Ryan Labs Research, The Seven Flaws of Duration (copy on file at the SEC Public Reference Room).
39 Id. at 12. For example, the duration of a zero-coupon bond is different at the beginning of its life than at the end.
40 Id.
41 See, e.g., Letter from Judith R. Hogan, Senior Legal Counsel, Fidelity Investments, to Jonathan G. Katz, Secretary, SEC, (July 27, 1995) (on file at the SEC Public Reference Room).
42 For example, Fitch Investor Services offers market risk ratings assigned on a scale of 'V-1', least volatile, through 'V-10', most volatile.
Current SEC guidelines require funds to use average weighted maturity to classify funds. Unlike average weighted maturity, however, duration is sensitive to certain derivative instruments (such as inverse floaters). Robert Plaze, assistant director of the SEC's investment management division, stated he felt duration was "doable" as an additional measurement, in addition to average weighted maturity.  

Such a policy is an example of how "portfolio shaping" rules can be more workable where the disclosure involves complex and ever changing calculations such as duration. Assuming a suitable standardized method of calculating duration could be conceived, a duration target would be more workable than disclosure. The snapshot problem would be eliminated because funds would constantly maintain a target duration. Investor misunderstanding and misinterpretation would not be an issue; because duration is not disclosed, the potential of investor reliance on duration as a complete measure of fund risk is removed, but investors are still protected from one significant facet of risk.

Finally, the concept release asked for comments on non-quantitative risk disclosure mechanisms, such as bar charts. Most notably, in the portion of the release for individual investors, the SEC included a bar chart showing ten year return volatility against ten year average total return, and asked investors if they would find it helpful "in understanding the ups and downs in a mutual fund's annual returns." Most investors responded in the

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43 Stirland, supra note 13, at 1.
44 Portfolio shaping rules refer to specific requirements or restrictions. An example would be a rule prohibiting investment in particular instruments, such as derivatives. See Howell E. Jackson, Regulation of Risk-Taking by Financial Intermediaries: A Comparative Analysis of the 1940 Act, ALI-ABA Course of Study, Investment Management Regulation, Oct 12, 1998, at 7.
45 See Concept Release, supra note 5, at 17179.
positive.46 In their response to the release, the ICI specifically endorsed the use of such a graph.47

Such a graph is not highly controversial because it doesn't provide any new information; indeed, such a graph can easily be constructed from the annual total return data required to be disclosed in the financial highlights table.48 Like standard deviation, the choice of time horizon affects the disclosure — if annual returns are used, short term volatility is hidden. Certainly the graph says nothing about present volatility, and does not facilitate comparison between funds. As will be discussed below, however, a graph can help increase the ability of investors to process information, and can make information disclosure more valuable without adding any additional data.

In sum, it is clear from the above discussion that mutual fund risk cannot be summarized in a single statistic, and often various risk statistics do not even fully estimate the risks they purport to represent. All the disclosure methods discussed above, however, do provide additional information about mutual funds that could potentially be useful to investors making purchasing decisions. If investors could understand the limitations of these statistics and were able to use them to enhance their decisions, then disclosure might be helpful despite the limitations. These are some of the issues addressed in the following sections.

46 Based only on my unscientific sampling of the individual investor responses.
47 Letter from Paul Schott Stevens, General Counsel, Investment Company Institute, to Jonathan G. Katz, Secretary, SEC (July. 28, 1995) (on file at the SEC Public Reference Room) [herinafter ICI Letter].
48 The ICI notes that while this is true, "investors may have a difficult time extracting [a bar graph]." Id. at 3. The ICI arguably underestimates the abilities of the lay investor.

The remaining sections of this paper seek to move beyond the problems of defining and forecasting risk and address how investors respond to risk and financial information. To begin, this section will briefly present some of the empirical information available concerning ordinary investors' perception of risk and their general level of sophistication concerning risk and basic financial information. This includes investor perception of certain widely used terms, as well as investor understanding of the historical performance of various instruments. Research in this area shows that in general, a large percentage of investors lack understanding of financial terms and investment basics.

Again, risk disclosure is aimed at ordinary investors. Obviously, in order to implement a successful information disclosure program, it is necessary to have some idea of the present level of the ability of investors to comprehend the information. The different methods of risk disclosure that have been proposed vary in complexity from simple charts to advanced statistical estimators. The proper comprehension of these tools require varying levels of investor sophistication, and where that sophistication is lacking, corresponding levels of explanation and education of investors. Based on the evidence below, it seems unlikely that the intricacies of complex statistics could be successfully explained to investors. As research has shown, if individuals do not understand information, they are likely to ignore it or use it incorrectly.

This evidence also forms the backdrop for the discussion below concerning the difficulties of informing people about risks. For example, analogies will be made to warning labels, such as those found on hazardous chemical products. Regulators have found it is quite difficult to design labels
that effectively convey the dangers of product usage to consumers. The
dangers of misusing chemicals, however, are simple and one-dimensional,
quite unlike financial risk. Thus the task of mutual fund regulators is much
more onerous.

This section draws substantially from research in the retirement savings
industry. In recent years, individuals investing for their retirement have
acquired greater control over their retirement assets, as 401(k) plans\textsuperscript{49} have
quickly been replacing traditional pension plans as the principal retirement
savings vehicle in this country.\textsuperscript{50} According to the most recent official
statistics available, from 1984 to 1992 the total number of 401(k) plans
increased eight-fold, while over the same period the total number of
traditional (defined benefit) plans decreased by almost 50\%.\textsuperscript{51} There is every
indication that this trend has continued into 1996, with 401(k) assets now
likely nearing $1 trillion.\textsuperscript{52}

\textsuperscript{49} A type of defined contribution plan, 401(k) plans permit employees to allocate a portion of
their before-tax compensation to a specified investment fund. Employers generally offer
employees a choice of different funds. Taxes on both contributions and investment earnings are
defferred until money is taken out of the account, making them especially attractive savings
vehicles. When a worker changes jobs, accumulated funds can be transferred into another
employer's plan, rolled over into an IRA or cashed out. Unless employees have reached age
591/2 or are totally disabled, however, withdrawals are subject to a 10 percent penalty. While
they are not required to do so, employers are allowed to match employee contributions in an
amount up to the lesser of $30,000 a year or 25 percent of pay. KAREN FERGUSON & KATE
BLACKWELL, PENSIONS IN CRISIS 172 (1995).

\textsuperscript{50} The switch to 401(k) plans in lieu of traditional defined benefit plans is the result of a
number of factors. Most significantly, because they entail less reporting requirements under
ERISA, the 401(k) is a less expensive alternative to the traditional pension plan. Because they
are "portable," 401(k) plans are also more responsive to the present-day demands of a mobile
work force and flexible staffing requirements. Finally, legislative pressures on the traditional
pension have made the 401(k) a more attractive alternative. See John Meehan et. al, The
Smart 401(k), BUS. WK., July 3, 1995, at 59; FERGUSON & BLACKWELL, supra note 49, at 173; &

\textsuperscript{51} Department of Labor, Private Pension Plan Bull., Winter 1995, at 59. These are the most
current figures available from the Department of Labor, which draws its data from Form 5500
Annual Reports.

\textsuperscript{52} See Meehan et. al, supra note 50, at 58, 60. Traditional pension assets have grown at half
the rate of 401(k) plan assets, to approximately $1.5 trillion, and will probably be overtaken
by 401(k) assets before the next century.
Because of these changes, employees can no longer depend on pension fund administrators to invest their retirement funds, forcing them to make their own investment decisions; these decisions provide insight into their level of understanding of financial concepts. For example, the long-term nature of retirement saving should dictate how retirement assets are allocated, namely, investment should be more heavily weighted toward equities. Unfortunately, the data reveals 401(k) plans are inadequately and inappropriately used. The concerns of business that employees are not adequately saving for their retirement has also produced research into investor behavior that lends well to this discussion.

**Investor Understanding of Risk: Risk as the Risk of Loss**

The concept of "risk" can have greatly divergent meanings depending on the perspective of the audience. To many non-academics, risk means the possibility of suffering a harm or loss. Risk is often considered to be a pure negative; for example, the risk of one's house burning down, or the risk of being mugged. This conception of risk carries over into the investment arena. A study of mutual fund shareholders by the ICI revealed that the common investor understands investment risk as the probability that a certain security will fall in price after it is purchased, or in other words, that an investor will lose "principal."^53 The individual investor comments submitted to the SEC seem to confirm that this perception of risk is prevalent.^54

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^54 The Concept Release asked investors whether they defined risk as "(1) the chance that you will lose part of your investment; (2) the chance that your investment will earn less than a certain amount . . . ; or (3) the variability in your fund's return, that is, the month-to-month or year-to-year ups and downs in your fund's share price or its distributions?" See Concept
Statisticians and investment professionals, however, have a different conception of risk. While risk entails the possibility of loss, risk is not negative in a normative sense. Instead, the presence of risk means that more than one outcome is possible. As discussed in Part II, in the investment context risk is an objective measure of volatility, both positive and negative, around an expected return.\textsuperscript{55} One of the most accepted and well documented theories of finance is that investors are rewarded for bearing certain types of risk.\textsuperscript{56} Therefore, while a "riskier" security has a greater chance of declining in value, it also has a greater chance of increasing in value.\textsuperscript{57}

Investors often do not have a sufficient understanding of the risk/return tradeoff, as well as other investment fundamentals — although many think that they do. In the ICI study, shareholders were asked to indicate, on a scale of zero to ten, their level of agreement with a number of statements; a score of ten indicates a strong agreement with the statement. Shareholders scored a relatively high 7.5 for the statement "the higher an investment's yield or rate of return, the greater its associated risk."\textsuperscript{58}

Other responses of investors, as well as their behavior, reveal that their actual understanding of this concept is incomplete. First, shareholders are mislead by various terms used by investor professionals and fund companies. In the ICI study, shareholders were asked to indicate how much risk they associated with certain terms. Shareholders associated more risk with "short-term" than with "blue-chip," and associated less risk with "long-term" than

\textsuperscript{55} As discussed above, standard deviation, an indicator of volatility, is the traditional measure of portfolio risk.
\textsuperscript{56} See, e.g., MALKIEL, supra note 14, at 219. Under classic portfolio theory, investors are only compensated for bearing undiversifiable, or systematic, risk.
\textsuperscript{57} As discussed in Part II, whether or not a securities chance of increasing in value equals its chance of decreasing in value depends on the shape of its return distribution.
\textsuperscript{58} SHAREHOLDER PERCEPTIONS, supra note 53, at 10.
with "short-term."\textsuperscript{59} "High-yield" received the highest score, 7.2, above "emerging growth" and "international."

The findings were more startling in a study conducted by Towers Perrin, a private employee benefits consulting firm, in which 1,000 individuals who worked for large organizations were queried on various savings-related topics.\textsuperscript{60} Thirty-five percent of savings plan participants thought "guaranteed" investments would perform better than stocks over a 20-year period, fifteen percent thought they would perform the same, and seventeen percent did not know.\textsuperscript{61} Thus half of those surveyed believed guaranteed investments would perform better or the same as equities over the long term. The results of a survey by John Hancock Mutual Life were similar: almost half of the respondents either thought it was impossible or didn't know if it was possible to lose money in a bond fund.\textsuperscript{62}

Investors also have extreme difficulty comprehending other factors that effect return, most notably inflation.\textsuperscript{63} For investors with long time horizons, the risk that returns will not outpace inflation are just as significant as the risk of a lengthy bear market or an illiquid derivative. For the 20-year period from 1974-1994, inflation eroded purchasing power by more than two-thirds; for example, $20,000 invested in 1974 would have to grow to $60,000 just to keep pace with inflation.\textsuperscript{64} While they are certainly less volatile, returns from fixed-income investments, especially cash funds, will almost certainly not provide returns that outpace inflation. Despite this, 50%-60% of

\textsuperscript{59} Because of increased interest rate risk, long-term bond funds are generally riskier than their short-term counterparts.

\textsuperscript{60} TOWERS PERRIN, PREPARING FOR RETIREMENT: 1,000 AMERICANS (1994).

\textsuperscript{61} Id. at 9.


\textsuperscript{63} According to one benefits consultant, investors "don't have a clue" about how inflation affects returns. Comments of Carol Igoe, Principal, Towers Perrin.

\textsuperscript{64} T. Rowe Price, Retirement Planning Kit (available from T. Rowe Price).
the assets in 401(k) plans remain in fixed-income and low-risk investments such as guaranteed investment contracts and money-market funds. Of course, shareholders in the ICI study strongly agreed with the statement "I try to make sure my investments keep pace with inflation."66

Finally, many investors fail to understand the concept of diversification. One indicia of this is the fact that the mean contribution to company stock, a staple in most 401(k) plans, was 33% of all contributions in 1994.67 Defined contribution plans among the largest 1000 plan sponsors have held between 21% and 25% of total plan assets in company stock for the past five years.68 Most professional equity portfolio managers, however, would shy away from investing more than 5% in a single stock within a diversified portfolio.69 In some cases, however, investment in company stock is required under plans seeking to align employee incentives with those of the company. Because of the inappropriate nature of company stock as a retirement vehicle, however, experts are urging companies to rethink such incentive plans.70

The perceptions and misunderstandings that investors possess about financial risk can influence the effect of disclosure policies in a number of ways. First, a lack of correlation between how regulators and laypersons perceive risk can lead to unintended results. Most investors perceive of risk as the chance of losing principal, yet many do not understand the risk/return tradeoff, and fewer have a solid grasp of the importance of other aspects that affect return, most notably inflation. This could lead investors to seek out investments with the lowest "risk" score, without consideration of the effect

65 Mecham et. al., supra note 50, at 59.
66 SHAREHOLDER PERCEPTIONS, supra note 53, at 18.
68 Id.
69 Id.
70 Id.
of that decision on potential returns. The individuals in the Towers Perrin study who believe "guaranteed" funds produce returns greater than or equal to equities would certainly steer toward the former if confronted with the relative riskiness of the two.

On the other hand, misperceptions about risk could lead investors to overlook risk disclosure altogether. Empirical evidence has shown that consumers will ignore information that they feel has little benefit, and such behavior can limit the effectiveness of information disclosure. More specifically, if consumers perceive little risk associated with a product, they are unlikely to seek out information about that product's potential risks. Professors Viscusi and Magat provide one example: one consumer marketing study found that the provision of nutritional information about vitamins and minerals had little impact on behavior. Despite the fact that almost 50% of the participants became aware of the availability of the information, few bothered to read it. In another study, nutritional information provided facts such as calories, sodium and sugar, and the impact was significant. Professor Viscusi postulates that because consumers perceive little risk from malnutrition, but higher risk from salt and sugar content, they do not seek out the low-risk information.

In our context, if investor perceptions are flawed concerning the risks of various instruments, they may fail to seek out information concerning it. For example, shareholders associated little risk with "long-term" and "fixed-rate" funds, and investors have traditionally viewed money-market funds as

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71 W. KIP VISCUSI & WESLEY A. MAGAT, LEARNING ABOUT RISK 17 (1987) [herinafter LEARNING ABOUT RISK].
72 Id. The information was presented in a format found to facilitate use.
73 SHAREHOLDER PERCEPTIONS, supra note 53, at 11. "Long-term" and "fixed-rate" received scores of 4.2 and 3.5, respectively.
"safe" investments. The SEC is concerned about informing investors about the risks that they actually take, yet if investors do not perceive any risk, they may not seek out the information about it. Therefore, had a risk disclosure system been in effect, "surprises" such as money-market funds "breaking the buck" and short-term government bond funds going under might still have caught many investors off guard.

Thus if the SEC wishes to insure that investors understand the risks they are taking, they must not only be concerned with whether investors will understand what a risk statistic means, but also whether investors will be concerned enough to seek risk information out at all. While the level of investor knowledge is largely outside the control of the SEC, regulators can take steps to make information easier for investors to retrieve and understand. This is the focus of the final sections of this paper.

74 Leslie Wayne, Investors Lose Money in 'Safe' Fund, THE N. Y. TIMES, Sept. 28, 1994, at D1. 75 The disincentive not to seek out information is exacerbated if the investor must wade through financial terms that they do not understand; the importance of reducing these "processing costs" will be considered in Part IV.
Part IV. Processing of Risk Information and Decisions Under Uncertainty

In this section, we move even further from the mathematical problems of measuring risk to explore the psychological aspects of risk perception. Human beings respond only to the risks that they perceive.\textsuperscript{76} Our perception of the risks we face is impacted by a multitude of factors, the most important of which is our past experience with the particular risk situation. Because human beings are imperfect processors of information about risk, however, our perceptions are often biased, sometimes in systematic ways. Furthermore, even if statistical evidence is available, human beings often are unable to correctly utilize that information and make accurate judgments concerning risk.

Misperceptions of risk and mistakes in probabilistic judgments are a result of the fact that human beings have limited capacity for sorting through information. This is a part of the theory of "bounded rationality."\textsuperscript{77} When making decisions, individuals are unable to make complicated calculations or engage in extensive computations without exerting substantial effort. They are also limited in their ability to carry out more than a few activities at one time.\textsuperscript{78} Human beings simply do not have the capabilities to use all the information that is potentially available to them.\textsuperscript{79}

One result of limited processing capacity is particularly important to our discussion. When faced with complex tasks, individuals utilize heuristics, or simple rules of thumb, to enable them to complete such tasks within their

\textsuperscript{76} Paul Slovic et al., Facts Versus Fears: Understanding Perceived Risk, in JUDGEMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 465 (Daniel Kahneman et al., eds, 1982).

\textsuperscript{77} See JAMES R. BETTMAN, INFORMATION PROCESSING THEORY OF CONSUMER CHOICE 17 (1979).

\textsuperscript{78} Id.

\textsuperscript{79} WESLEY A. MAGAT AND W. KIP VISCUSI, INFORMATIONAL APPROACHES TO REGULATION 88 (1992) [hereinafter INFORMATIONAL APPROACHES].
available capacity. For example, under the elimination-by-aspects heuristic, when choosing between alternative products, a consumer sets up minimum cutoffs for each dimension (such as quality or price). If an alternative does not pass all cutoffs, it is rejected. The consumer will only undertake extensive analysis and comparison of different dimensions for those alternatives that exceed all cutoffs. Under a similar rule, the lexicographic heuristic, the decision maker determines the most important attribute, and simply selects the alternative with the highest value for that attribute. Human beings use various heuristic techniques when facing choices involving risk and uncertainty. These methods, and their impact on effective risk disclosure, are a primary focus of the discussion below.

A fundamental distinction between various heuristics that is central to the discussion of mutual fund risk disclosure is the extent to which the choice strategy makes tradeoffs between various attributes (in our context, attributes might include risk, fees, third-party rating, past performance, etc.) Choice strategies that make tradeoffs — in other words, that consider all available attribute information — are known as compensatory strategies, while those that do not make tradeoffs (such as the lexicographic heuristic described above), or make limited tradeoffs, are called noncompensatory strategies. When individuals make decisions using noncompensatory heuristics, their decisions are incomplete and potentially irrational. The significance of the fear expressed by commentators that mutual fund investors might rely solely on a risk statistic for purchasing decisions depends in large part on how investors process mutual fund information.

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80 Bettman, supra note 77, at 18.
81 Id. at 180. Note that because of the noncompensatory nature of the heuristic, negative data is weighted more heavily than positive data.
Bounded rationality and the resulting biases in risk perception implicate mutual fund risk regulation on two broad levels. First, in order to effectively communicate the risks of a particular fund to individuals, it is necessary to understand how human beings process and respond to risk information. Once a method of measuring fund risk is decided upon, human processing capabilities still stand between regulators and beneficial social behavior. Understanding how people perceive information about risk provides insight into which methods of *presentation* of risk information are most easily comprehensible by individuals, and the least likely to be misperceived. The discussion of presentation of risk information draws significantly from research in marketing and psychology, as well as the literature on consumer responses to hazard warning labels and the efficacy of these labels in altering consumer behavior.

The second implication focuses on the rule making initiative itself. Regulators seeking to protect the public from various hazards are also susceptible to biases in risk perception — but their misperceptions are often much more costly on a societal level. Human beings have a tendency to overestimate certain risks, especially those that are more sensational, and underestimate others. Expensive regulatory regimes are often constructed to combat risks that, while quite visible, present little danger to society. Extensive media coverage can also bias government perception of the dangers that require their attention. These biases can be exacerbated by corrupt data collected from the public, expressing risks that they are misperceiving; therefore attempts to gauge public concern — such as the Concept Release — must be examined through a lens that takes account of potential overreaction. Regulators must seek to assess the absolute magnitude of risks; otherwise, a
costly regulatory requirement would result in an inefficient allocation of resources and unnecessary restraints on the market.\textsuperscript{83}

A. Presentation and Processing of Risk Information

The presentation of information is an important aspect of any informational disclosure program. While content is certainly the primary concern, sometimes the format of information can have a drastic effect on how individuals respond to the information. Unfortunately, as will be discussed, the complex nature of risk information makes comprehensible presentation difficult, creating yet another hurdle to effective risk disclosure. Also, additional information could potentially cause an "overload" effect, thereby actually decreasing the amount of information actually considered by investors.

As discussed above, individuals use various heuristic techniques when faced with difficult choice tasks.\textsuperscript{84} The use of specific heuristics, however, tends to be contingent on variations in the properties of the decision problem, such as the number of alternatives and the format in which the information is presented.\textsuperscript{85} In other words, decision makers are adaptive — the strategies we utilize to make a decision depend heavily on the characteristics of the choice task. Changing the format of information changes the choice task can increase the "processability" of the information — the ease with which information can be comprehended and used.\textsuperscript{86}

\textsuperscript{83} See W. KIP VISCUSI ET. AL., ECONOMICS OF REGULATION AND ANTITRUST 660 (2nd. ed. 1995).

\textsuperscript{84} Some of the choice heuristics individuals use when making decisions under uncertainty are discussed in part III.B., infra.

\textsuperscript{85} PAYNE, ET AL., supra note 82, at 3.

\textsuperscript{86} LEARNING ABOUT RISK, supra note 71, at 26.
Because an individuals decision making strategy is contingent on the choice task, decisions can sometimes be improved by simple changes in the "information environments" in which individuals make decisions. For example, in a now classic study, Jay Russo postulated that while unit price information benefits consumers in making purchasing decisions, they are unable to utilize the information because of the way it is commonly displayed. Unit prices are generally available only under each product on the shelf. When unit prices were instead listed together in one place, from lowest to highest, consumers made more effective decisions. Therefore, a simple change of format increased the processability, and therefore the effectiveness, of information disclosure.

Another study examined the use of automobile seat belts. Fatal automobile accidents occur about once in every 3.5 million trips, and disabling injuries are sustained about once every 100,000 trips. Hypothesizing that people did not wear seat belts because of a correct perception of the small single-trip risk, the researchers reformatted the information to a multi-trip perspective: in a lifetime of driving, the odds of a fatal crash are 1%, and the probability of experiencing a disabling injury is 33%. The study found that attitudes toward wearing seat belts were more favorable when the information was presented in the latter format.

87 PAYNE, ET AL., supra note 82, at 7.
88 J. Edward Russo, The Value of Unit Price Information, 14 J. OF MARKETING RESEARCH 193 (1977). Russo sought to discover whether the cost of providing consumers with unit price information created a commensurate benefit to retailers.
89 Id. at196.
90 LEARNING ABOUT RISK, supra note 71, at 18.
Congruence and Other Principles of Effective Presentation

An important aspect of improving the processability of information involves establishing congruence between the format and organization of the information and the type of processing that will be undertaken.\textsuperscript{91} Such congruence can be established in one of two ways. A reactive approach involves determining which strategies decision makers utilize and then presenting information in a manner better suited to that heuristic. For example, because consumers like to compare information on several attributes against several alternatives, Consumer Reports provides matrix displays of such information that makes this type of processing easier.\textsuperscript{92} A proactive approach is more appealing to regulatory initiatives such as mutual fund risk disclosure. Policy makers can first decide how people should process information, and use presentations that facilitate that type of processing. The form in which car mileage information is presented on window stickers is one example — it facilitates the comparison of the mileage information across automobiles.\textsuperscript{93}

By choice of a particular format, policy makers can encourage certain types of processing. This is an aspect of the theory of "concreteness," which holds that decision makers will "tend to use only that information that is explicitly displayed, and will use it only in the form it is displayed."\textsuperscript{94} Several studies have shown that information acquisition and processing will take place in a manner that is consistent with the display format. For example, Bettman and

\textsuperscript{91} Payne, et al., supra note 82, at 224.
\textsuperscript{92} Id.
\textsuperscript{93} Id.
\textsuperscript{94} Id. at 48.
Kakkar showed that when displays encourage alternative-based processing, more alternative-based processing was observed.\textsuperscript{95}

Thus in designing a risk disclosure system, regulators should have a clear understanding of the type of processing they wish to encourage. In our context, for example, a single standardized risk statistic or score likely would encourage individuals to "comparison shop" between different funds. On the other hand, a bar graph of 10-year returns, such as the one proposed by the ICI, would encourage investors to more closely examine the past history of a particular fund and determine whether the risks of that fund are worthy of its potential return.\textsuperscript{96} A bar graph, however, would not facilitate comparison between different funds.

As the Russo study showed, simple changes in design can increase effectiveness. Research focused on creating hazard warning labels provides several design principles that facilitate processability.\textsuperscript{97} Some of the most important design principles facilitate ease of location; effective labels make it easy for consumers to locate critical information. Important information can be made easier to locate through the use of different fonts, colors and type sizes. Another critical requirement is consistent organization — if information is in the same place on all labels, locating the information is much easier. Another maxim of label design is that information be simple.

\textsuperscript{95} John R., Bettman and P. Kakkar, \textit{Effects of Information Presentation Format on Consumer Information Acquisition Strategies, 7]. OF. CONSUMER RESEARCH 234 (1977).}
\textsuperscript{96} Bettman, Payne and Staufen list three major considerations that govern the general principles of format and organization: (1) reducing the cognitive effort and/or time needed to locate the externally available information (the label), retrieve any previously stored information, and encode the newly provided information; (2) reduce the cognitive effort and/or time needed to make risk-benefit tradeoffs within a particular alternative; and (3) reduce the cognitive effort and/or time needed to make comparisons among different brands or alternatives. A single risk statistic assists in the third consideration, while the bar chart assists in the second. \textit{LEARNING ABOUT RISK, supra note 71, at 26.}
\textsuperscript{97} \textit{Id. at 13.}
and easily understood. For example, hazard warning labels often utilize symbols to represent various hazards, such as the skull-and-cross-bones. 98

As mentioned briefly in Part II, new funds without past performance data cannot provide certain risk indicators, such as standard deviation, based on historical data. Marketing research into the completeness of information displays provides insight into how investors might deal with this situation. First, investors could infer the value based on other attributes of the fund. 99 Alternatively, investors might simply avoid funds without past track records as a method of avoiding uncertainty. Studies have shown consumers recognize the uncertainty of making inferences, and therefore discount partially described alternatives. 100 Such an effect could already be present when past performance data, which must be disclosed, is unavailable; a risk statistic, however, could enhance investor aversion to new funds. 101

**Difficult Task Environments and Information Overload**

Choosing a mutual fund can be an overwhelming process. As the mutual fund industry has boomed, there are now a tremendous number of alternatives available: hundreds of mutual fund companies offer over 3,700 mutual funds. 102 In addition, mutual funds have a large number of attributes that an investor can look to when making a decision; these include fees, past performance, credibility of the manager or fund company, and of course, various indicators of risk. Analyzing many of these attributes may require technical knowledge or an ability to maneuver through legalese. In

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98 Id.
99 PAYNE, ET AL., supra note 82, at 51.
100 Id.
101 This is not necessarily an effect regulators would want to avoid. Less investing in unestablished funds protects the public from potential mismanagement by unproven advisors.
the decision making literature, a choice environment that is characterized by a large number of alternatives with many complex attributes is known as difficult task environment. A substantial amount of literature focuses on how individuals respond to difficult task environments.

A number of studies have shown that individuals use different decision strategies depending on the number of alternatives. Generally, when only a few alternatives are present, decision makers tend to thoroughly examine all the attributes of each choice — in other words, they utilize compensatory strategies. When faced with a greater number of alternatives, however, decision makers resort to noncompensatory strategies, such as the elimination-by-aspects heuristic discussed above. Unfortunately, the number of mutual funds available to investors is not a variable within the control of regulators.

As noted above, the number of attributes of information also implicates decision making. Most notably, some researchers argue that increasing the amount of attribute information actually can hinder processing. Whether or not it is possible to provide consumers with too much information, a phenomena known as "information overload," is one of the more controversial questions in the consumer research literature. The seminal studies, conducted by Jacob Jacoby and his colleagues, presented empirical results that they claimed demonstrated the existence of an information overload effect. A study by Naresh Malhotra, designed to overcome

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103 For a list of experiments that document this effect see PAYNE, ET AL., supra note 82, at 34.
104 Id.
105 Robert J. Meyer and Eric J. Johnson, Information Overload and the Nonrobustness of Linear Models: A Comment on Keller and Staelin, 15 J. OF CONSUMER RESEARCH 498 (1989). A review of the literature, which will be partially summarized here, can be found in INFORMATIONAL APPROACHES, supra note 79, at 90.
criticisms of the Jacoby studies, found evidence of an overload effect when consumers were provided with ten or more alternatives in their choice set, or given an excessive number of product attributes.\textsuperscript{107} Another study found that a higher quantity of information decreased "decision effectiveness," defined as the difference between the utility of a consumers choice and his optimal choice, but higher quality of information increased decision effectiveness.\textsuperscript{108} Other studies, however, have failed to find an overload effect,\textsuperscript{109} or found it only in association with time pressure.\textsuperscript{110}

A study particularly informative to our discussion sought to determine how individuals went about making decisions in a particular difficult task environment.\textsuperscript{111} A difficult task environment was defined as one characterized by: (1) a large number of alternatives; (2) information on a large number of attributes about each alternative presented in a format that does lend itself to easy use; and (2) a product or service that is inherently complex.\textsuperscript{112} Ordinary life insurance was selected as a service characterized by a very difficult task environment, based in part on the "enormous "number of life insurance companies and the considerable amount of information available.\textsuperscript{113} The study also noted the legal aspects of the life insurance contract, causing it to be characterized by "complex concepts presented in a technical language."\textsuperscript{114}

\textsuperscript{109} See, e.g., Meyer and Johnson, \textit{supra} note 105. The authors note the "inherent difficulties in testing for information overload."
\textsuperscript{110} Hahn et al., \textit{The Effects of Time Pressure and Information Load on Decision Quality}, 9 PSYCHOLOGY AND MARKETING 365 (1992).
\textsuperscript{111} Roger A. Formisano et. al., \textit{Choice Strategy in a Difficult Task Environment}, 8 JOURNAL OF CONSUMER RESEARCH 474 (1982).
\textsuperscript{112} \textit{Id.} at 475.
\textsuperscript{113} \textit{Id.} at 475.
\textsuperscript{114} \textit{Id.}
When asked how they went about choosing a policy, the respondents provided some startling answers. Seventy-five percent of the respondents stated "no" to the question, "Did you investigate any other insurance companies?" Sixty-six percent stated that they did not read anything to help in the life insurance purchase. What were their decisions based on? Seventy-one percent of the respondents bought the policy that the salesperson recommended. Choosing upon the advice of others is an example of a noncompensatory (and particularly limited) choice heuristic. Indeed, quite often consumers base their purchasing choices on such bases as the recommendations of sales persons, imitating the purchases of others — or even on random or superficial bases.

The implications of this research to the mutual fund context are both patent and important. The decision of what fund to invest is readily comparable to the life insurance purchase decision. Most notably, both choice tasks involve not only struggling with difficult financial concepts but also with technical legal language that can frustrate the lay consumer. Indeed, one of the most consistent criticisms directed at the current disclosure regime in the responses to the Concept Release related to the difficulty of understanding legal concepts in prospectuses.

The purpose of presenting this research is not to condemn all mutual fund disclosure as useless. However, the potential for information overload, or a complete lack of consumer decision making, should at least be taken into consideration by policy makers. Quite simply, if a substantial number of

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115 *Id. at 477.*
117 Once again, based on an unscientific sampling of individual investor responses. Many investors felt prospectuses were purposefully vague to avoid litigation, while one referred to the legalese as "verbal gobbledygook."
individuals are unable to process the information then the resulting benefit of a disclosure program will be dramatically decreased and potentially unworthy of its cost. Regulators should look to the results of the marketing literature in fashioning a disclosure requirement that will in fact be processable by investors; if risk disclosure is simply too complex to be processed, these facts should weigh heavily in the decision whether or not to proceed. Empirical analysis of the actual effectiveness of any disclosure method should precede the enactment of any formal requirements.

Fortunately, the concepts discussed above can be utilized to make existing disclosure requirements more effective. Consumers currently find prospectuses difficult to process; changes in presentation can improve processability, and thereby reduce difficulty of the choice task and the impact of information overload. The SEC should examine current initiatives by mutual fund companies to increase the processability of prospectuses and consider whether certain organizations and formats might be mandated to make prospectus comprehension easier, without necessarily adding any new information. This will be discussed in greater detail in Section III.C. below.

B. Investor Behavior: Decisions Under Uncertainty

The final issue implicated in risk disclosure involves how people make decisions in situations of uncertainty. The literature on decision making under uncertainty is driven by the same cognitive considerations as the above discussion, namely, that human beings possess bounded rationality. This issue differs somewhat from the discussion of processability, however. Even if there are no external barriers to processability (i.e., choices are presented clearly), human beings often fail to react rationally to certain types of information.
The decision of whether or not to invest in a mutual fund is based on a belief concerning the likelihood of an uncertain event, namely, the return (or loss) the fund will provide. Expected utility theory is the dominant modern economic model for analyzing choice under uncertainty. This paradigm, however, was conceived of as a normative model of an idealized decision maker, rather than as a description of the behavior of real people. Under this theory, individuals are considered to be rational maximizers who correctly apply the rules of logic. The arguments that individuals operate under such theories are strong; optimal choices increase the chances of survival in a competitive environment, and a minority of rational individuals can sometimes impose rationality on the whole market.

A number of academics have argued, however, that the logic of choice does not provide an adequate foundation for a plausible descriptive theory of decision making. In other words, individuals do not consistently behave in a rational manner when making decisions under conditions of uncertainty, because processing probabilistic data puts severe pressure on the rationality of human decision makers. More interestingly, numerous studies in the fields of psychology and economics have shown that actual behavior differs from rational choice in systematic ways. People consistently commit the same errors when making decisions under uncertainty.

118 W. KIP VISCUSI, FATAL TRADEOFFS 111 (1992). In expected utility theory, the utility of each possible outcome is weighted by its probability. For example, a 50% chance of gaining 10 units should be equal in value to a 5% chance of gaining 100 units.
119 Amos Tversky & Daniel Kahneman, Rational Choice and the Framing of Decisions, 59 J. OF BUS. S251 (1986). The authors present a summary of the assumptions which form the foundations of expected utility theory. One important condition is the principal of invariance: different representations of the same choice problem should lead to the same preference.
120 Id.
121 AMOS TVERSKY & DANIEL KAHNEMAN, Judgment Under Uncertainty: Heuristics and Biases, in JUDGEMENT UNDER UNCERTAINTY: HEURISTICS AND BIASES 3 (Daniel Kahneman et al., eds, 1982).
The irrationality of choices under uncertainty is of great importance to regulation in our context. If people respond irrationally to risk information, the actual and intended results of government disclosure policies could diverge, limiting the effectiveness of such regulation. More interestingly, present-day mutual fund investors, as well as the media, could be misperceiving the risks in the industry, such as the risks of fund crashes and hidden derivatives. Current investment decisions could be based on flawed perceptions of the risks they face, and the responses to the concept release could also mirror flawed perceptions. Below I will examine some of the anomalies which have been documented, how these theories might explain some of the investor beliefs and misperceptions, and the potential impact of these theories on the issue of mutual fund risk disclosure.

This section will deal with two aspects of decision making under uncertainty. First, we will consider how individuals perceive of risk when statistical evidence is not available: for example, if one was asked off hand to compare the risk of driving a car to the risk of cancer. Individuals perceptions of the risks they face is particularly relevant to policy makers attempting to gauge public concern over risks they might regulate. Second, we will consider how human beings act irrationally when evaluating risks that are clearly presented in an easily understood format. Potentially, individuals could misperceive the risk associated with mutual funds even if accurate information was provided to them.
Availability

When individuals are asked to assess the risks they face, they again utilize specific heuristic methods. The heuristic perhaps most relevant to this context is known as availability. Under this rule, people judge an event as likely if it is easy to imagine or recall. Availability often leads to rational judgments, because events that are more frequent, and therefore statistically more probable, are generally easier to recall. Factors unrelated to probability, however, often influence availability. For example, more recent events tend are more available then earlier events; ones subjective assessment of the risk of being involved in a traffic accident increases temporarily when one witnesses an accident. Availability is also enhanced by the salience of a recent event — for example, a particularly gruesome or surprising accident would leave a greater impression and therefore be more available. Extensive media coverage of a low-probability event can also strongly influence availability, causing people to misperceive its likelihood in the future.

A classic study of the availability heuristic involved an experiment in which college students were asked which of two causes of death were more frequent. The participants consistently overestimated the probability of some causes, and underestimated the probability of others. Generally, spectacular forms of death were overestimated: death by homicide was judged to be about just as likely as death by stroke, although strokes claim about 11 times as many victims. Underestimated causes, on the other hand, were dull and unspectacular, such as asthma and diabetes (both of which, interestingly, are common in nonfatal form).

122 Id.
123 Id. at 11.
124 Slovic et. al., supra note 76, at 466.
125 Id.
Loss Aversion and Responsibility Costs

One of the central conclusions of the study of risky choice has been that individuals are not sensitive to absolute states of wealth or welfare, but rather to changes relative to a neutral reference point.126 Loss aversion refers to the notion that changes that make things worse relative to the neutral reference point loom larger than improvements or gains. Since these preferences depend on how the outcomes are framed, the behavior violates expected utility theory.127 Khaneman and Tversky found that people weigh prospective losses about twice as heavily in their calculations as prospective gains.128

A related concept is aversion to regret. For example, in one study subjects were told that they had been exposed to a rare fatal disease from which they now faced a .001 chance of painless death in a week and then asked how much they would pay for a vaccine.129 The same subjects were also asked how much compensation they would demand to take part in a medical experiment in which they faced a .001 chance of quick and painless death. The results differed by more than an order of magnitude, which probably indicates a "responsibility cost" for assumption of risk, as opposed to involuntary exposure to risk. Meir Statman argues that regret aversion is a factor in individual investment decisions. For example, if the pain of regret is significantly greater than its counterpart, the joy of pride, investors will

128 See D. Khaneman & A. Tversky, Prospect Theory: An Analysis of Decision Under Risk, 47 ECONOMETRICA 263 (1979). The authors propose an alternative to expected utility theory, prospect theory, to explain choice under risk. Prospect theory incorporates loss aversion as well as other behavioral anomalies. See also D. Khaneman and A. Tversky, Advances in Prospect Theory: Cumulative Representation of Uncertainty, 5 J. of Risk and Uncertainty 297 (1992).
129 See Thaler, supra note 126, at 73.
choose to keep their assets in cash rather than risk the regret from suffering a loss in the market.\textsuperscript{130}

Investors' perceptions of mutual fund risk are probably affected by loss aversion and aversion to regret. Because individuals are inclined to put more weight on the potential for loss than a rational actor should, they are over-concerned about the potential for investment losses. This concern is enhanced by aversion to regret, because mutual fund investment is generally voluntary, whether individuals invest privately or chose between options in a 401(k) plan. This might help explain why investors are primarily concerned with losing money in mutual funds.

Two academics have combined loss aversion with other cognitive theories to construct a solution to what market theorists call the "equity premium puzzle," which refers to the enormous discrepancy between the returns on stocks and fixed-income securities.\textsuperscript{131} Based on the absolute riskiness of the two assets, normal loss aversion does not explain the discrepancy.\textsuperscript{132} The theory of "myopic loss aversion" postulates that because investors are loss averse and tend to evaluate their portfolios frequently, even if investing for the long term, they demand a premium for enduring periodic fluctuations. This tendency to concentrate too much on short-term volatility would also help explain why retirement assets remain in fixed income funds. Even though investors saving for retirement know they won't be cashing out for years, it "spoils their dinner" if their stocks drop in value.\textsuperscript{133}

\textsuperscript{130} Meir Statman, \textit{A Behavioral Framework For Dollar Cost Averaging}, J. OF. PORTFOLIO MANAGEMENT, Fall 1995, at 70.
\textsuperscript{132} Id. Investors would have to have coefficients of relative risk aversion greater than 30, whereas actual estimates are closer to 1.
\textsuperscript{133} David Dreman, \textit{Outpsyching the Market}, FORBES, June 19, 1995, at 162.
Status Quo Bias

Another phenomena that implicates our discussion is known as status quo bias. When faced with new options, decision makers often chose to stick with the status quo alternative. For example, voters tend to elect the incumbent and consumers tend to purchase the same product brand. Status quo bias is arguably a manifestation of loss aversion. Such a bias violates rational choice, because labeling one alternative as the status quo should not change its value (assuming all else remains equal). Samuelson and Zeckhauser demonstrated this effect by experiments where some subjects were given decision problems in a "neutral" version, while others were given the same decision task with one option designated as the status quo. In one particularly applicable experiment, the "neutral" choice task was as follows:

You are a serious reader of the financial pages but until recently have had few funds to invest. That is when you inherited a large sum of money from your great uncle. You are considering different portfolios. Your choices are: a moderate-risk company, a high-risk company, treasury bills, and municipal bonds (the potential returns for each are listed). The second case offers the same choices, but after the same opening sentence the paragraph reads:

...... That is when you inherited a portfolio of cash and securities from your great uncle. A significant portion of this portfolio invested in [the moderate-risk company]. You are

134 Samuelson & Zeckhauser, supra note 127, at 7. See also Richard Thaler, Toward a Positive Theory of Consumer Choice, 1 JOURNAL OF ECON. AND BEHAVIOR ORGANIZATION 36 (1980). 135 Taking the status quo as the reference point, an individual subject to loss aversion weights potential losses from switching as larger than potential gains, and is therefore biased toward the status quo. Samuelson & Zeckhauser, however, do not believe loss aversion adequately explains their results. Samuelson and Zeckhauser, supra note 127, at 37. 136 Id.
deliberating whether to leave the portfolio intact or to change it by investing in other securities. The tax and broker commission consequences of any change are insignificant.

Using a number of similarly designed experiments, Samuelson and Zeckhauser were able to estimate the probability of an option being selected when it was designated the status quo. They found that an alternative becomes significantly more attractive if it is the status quo, and that the advantages of the status quo increase with the number of alternatives.\(^{137}\)

Status quo bias can influence regulators in much the same way as availability. Status quo bias appears in government regulation of health risks; products that cause new forms of cancer generally arouse greater public concern, and new products and technologies are regulated more strictly than those that present familiar risks.\(^{138}\) Government regulators closely scrutinize man-made carcinogens, yet higher levels of natural carcinogens are tolerated. Similar biases could be present in the mutual fund context, as will be discussed below.

Low-Probability Bias

A phenomena related to both loss aversion and availability is low-probability bias. Several researchers have argued that decisions concerning very low-probability events differ from decisions involving high-probability events by amounts that are not consistent with the pure differences in the probabilities.\(^{139}\) Evidence has been offered to support a bias toward underweighting low-probability events as well as toward over-weighting

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\(^{137}\) Id.

\(^{138}\) W. Kip Viscusi & Richard J. Zeckhauser, *Risk Within Reason*, SCIENCE, May 4, 1990, at 559, 560. Some argue the differences between the regulation of alcohol and marijuana are an example of such regulatory bias.

\(^{139}\) *LEARNING ABOUT RISK*, supra note 71, at 90.
them. One study of consumer willingness to pay to avoid risks from hazardous wastes found consumers attach a higher marginal valuation to risk reduction in cases of low-probability accidents than to higher-probability accidents.\(^{140}\) A similar result was found in a study of consumer willingness to avoid morbidity risks from hazardous chemical products.\(^{141}\) In contrast, a study that focused on consumer decisions to purchase disaster insurance argued that when probabilities fall below a threshold, consumers essentially ignore the probabilities for even catastrophic events.\(^{142}\)

Viscusi proposes a hypothesis consistent with all of the above results that focuses on the inability of individuals mentally to trade off probabilistic characteristics of different events.\(^{143}\) If people are *forced* to consider low-probability events (such as by a survey), they may respond by mentally augmenting the probability to a level familiar to them.\(^{144}\) If decision makers are allowed to ignore low-probability events, however, they may do so in order to simplify processing costs of making those decisions.\(^{145}\) There may also be a difference in consumer perception of health risks, such as those in the hazardous chemical study, and financial risks, such as those that are reduced through purchasing disaster insurance.

Low-probability bias could explain investor perceptions of money-market mutual funds, which generally have a low risk of loss. The mutual fund context is closer to Kunreuther’s study; investors are not "forced" to consider risk information, and like the risk covered by insurance, mutual fund risk is

\(^{140}\) Id.
\(^{141}\) Id. at 60. The authors compare these results with consumer reactions to the 1979 Three Mile Island accident and the 1981 Tylenol poisonings.
\(^{143}\) LEARNING ABOUT RISK, *supra* note 81, at 91.
\(^{144}\) Id.
\(^{145}\) Id.
financial risk. This might cause investors to ignore the small amount of risk that is present in money-market funds, causing them to view money-market funds as "guaranteed," a phenomena which is prevalent.

C. The Impact on Risk Disclosure

This section will discuss some of the potential implications of the psychology of risk perception on the construction of a mutual fund risk disclosure regime. As noted above, the primary audience of risk disclosure is the general public, not investment professionals. One argument in defense of elaborate disclosure through dense prospectuses that few individual investors read is that the information will enter the market through professionals, thereby contributing to overall market efficiency to the benefit of ordinary investors.146 Market professionals, however, already have access to the this type of risk information. The risk disclosure contemplated by the Concept Release is for the ordinary investor — this is why comments were solicited from the public (for the first time). Therefore, the success or failure of risk disclosure must be measured by its actual impact on investor decision making. While a comprehensive risk statistic that can be reliably estimated is a necessary prerequisite, devising such a method is only the first step in developing effective disclosure. As Professor Viscusi points out, "There is an important human element involved in the processing of information and in the decisions using the information, and one must take into account both this limitation and the decision making orientation in which the information will be used."147

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147 INFORMATIONAL APPROACHES, supra note 79, at 4.
When designing an information disclosure device, policy makers can encourage certain types of processing by using certain formats. As noted above, quantitative measures such as standard deviation and beta would likely facilitate alternative-based processing — comparisons between different funds. Indeed, the ability to compare funds is one of the SEC's primary goals for this initiative; the Concept Release notes that "[T]he number and types of funds have proliferated, increasing fund investors need for information that will help them compare and contrast alternatives."\textsuperscript{148}

Perhaps this goal should be reevaluated. Based on the heuristic techniques individuals utilize to make choices between a large number of alternatives, providing investors with a method of easily comparing funds of different types would be very likely to reduce the amount of processing undertaken. A single quantitative measure of risk would facilitate noncompensatory choice strategies. Investors would be less likely to undertake more comprehensive analysis, such as reading the narrative risk section of the prospectus. The narrative risk disclosure certainly provides a more comprehensive description of the risks of a various funds than any statistic currently under consideration by the SEC.

This is similar to the "reliance" argument that have been expressed by various commentators, who fear that investors will rely solely on a single quantitative measure to inform them about fund risk. The influence of the popular Morningstar rating system seems to indicate that such an outcome is possible. In the first half of 1995 more than half of the money invested in mutual funds went into funds that received five stars, Morningstar's highest rating.\textsuperscript{149} The next quarter of money invested went into four-star funds.\textsuperscript{150}

\textsuperscript{148} See Concept Release at 17173.
\textsuperscript{150} Id.
In addition to third-party rating services, investors' initial choice of funds is influenced by other factors outside the scope of the prospectus. Recommendations of friends and advertisements certainly play a large role in investor decisions. Based on the results of the life insurance purchase study, it is reasonable to assume that an investor's initial choice of a fund, or a group of funds to consider more seriously, is largely outside the control of the SEC. For example, a hypothetical investor might talk to friends and collect the names of five funds. Assuming he actually plans on doing more analysis and obtains prospectuses, what kind of processing should the prospectus facilitate?

At this point, investors should be encouraged to undertake compensatory processing of all the attributes of the various funds, which would be accomplished by reading the prospectus and obtaining further information from other sources. Even assuming a risk statistic might reveal "hidden" risks of two otherwise comparable funds, which is unlikely, a single statistic that encourages noncompensatory processing corrupts the entire decision process, thereby reducing the overall effectiveness of the investor's choice. Indeed, it is more likely that "hidden risks" would be uncovered by a thorough analysis of each fund. While there is no guarantee that investors will undertake comprehensive investigation of even a few funds, regulators should not encourage noncompensatory choice strategies, especially considering that the quantitative alternatives available do not accurately reveal all aspects of fund risk.

The possibility of explaining the limitations of a quantitative risk measure in the prospectus, especially the more complex candidates such as beta, are also considerably dampened by the decision-making literature. One of the central design principles for hazard warning labels involved making the risks easy to understand. Unfortunately, the complex nature of a risk statistic is
directly adverse to this principle. It seems quite likely that investors would either ignore the explanatory comment and make their decisions based on their inaccurate understanding of the statistic, or alternatively disregard the risk disclosure entirely.

Finally, if a valid statistic that investors understood could actually be devised, effects such low probability bias could still lead investors to faulty choices. Low probabilities are difficult for humans to process; when the risk level of a specific fund is very low, investors might not correctly incorporate it in their investment decisions. Investors could also find it difficult to compare funds where the difference in risk is a very small number.

Therefore, it is evident that adding risk information to the prospectus could actually render disclosure less effective. The principles discussed above, however, can be applied to prospectus disclosure to increase its processability without adding any new information. The 10-year bar graph is an example; as noted, the bar graph does not supply any new information, but makes information already contained in the prospectus easier to understand. First, organization could be made more consistent. While narrative risk information is required to be included in prospectuses, different prospectuses label the risk section differently, and risk information is generally a few pages into the prospectus. An initial disclosure could be moved to the cover, perhaps in red type, directing investors to the risk section. An easily recognizable symbol could be added to identify the risk area to individuals. Simple changes such as these could increase the likelihood that individuals would locate and process narrative risk information.

151 For example, risk information in T.Rowe Price prospectuses falls under the heading "Fund, Market, and Risk Characteristics," while Vanguard labels their risk narrative "Investment Risks."
Some fund companies have already begun to apply these principles to make narrative risk information in prospectuses and advertising material more processable. Companies such as Vanguard and T. Rowe Price have added bold-face margin notes to their prospectuses that highlight important aspects of particular sections or refer investors to other materials. New Vanguard prospectuses literally "flag" various risks with little flag icons in the text.\textsuperscript{152} T. Rowe Price prospectuses include a summary of risk factors on the cover under the heading "Risk/Reward."\textsuperscript{153} The SEC should look to these market solutions for guidance in subsequent policy making.

As noted earlier, regulation through disclosure is appealing because informational inadequacies can be overcome without unduly constraining the market. Because general human cognitive limitations work against certain detailed information programs, however, if policy goals are important enough other forms of regulation should be considered. As discussed in Part II, the a duration target for bond funds is an example of a "portfolio shaping rule," as opposed to a disclosure requirement, that might be better suited for the mutual fund context. Although certain portfolio shaping rules, such as a limitation on investment in certain derivative instruments, would clearly limit market choices, if there is broad public consensus that a danger exists, such methods might be the only form of effective regulation. Mandatory seat belt laws are an example of a similar choice in the consumer safety field.\textsuperscript{154}

Mutual fund regulators have already decided this is the best course in the context of money-market funds. New standards were recently released

\textsuperscript{153} For example, the T. Rowe Price International Equity Funds prospectus notes that "funds investing in a single country . . . represent higher risk and potential reward that those with greater geographic diversification . . ."  
\textsuperscript{154} See Viscusi & Zeckhauser, supra note 138, at 559.
restricting the investment options of taxable-exempt money-market funds; such funds will be required to reduce their exposure to interest rate, credit, and currency related risks. While intended primarily for tax-exempt funds, according to the Barry Barbash, SEC Director of Investment Management, the rules have "broad implications for all money-market funds." Thus in the context of money-market funds, were investor expectations of stability of particularly high, the SEC has determined that effective regulation requires the use of methods more intrusive than disclosure.

Public Perception of Risk and Overreaction

As the SEC continues to regulate in this area, however, they should be sure they clearly understand the actual dangers to investors. Determining the importance of regulatory goals is a difficult task, because public perceptions also influenced by the biases in risk perception discussed above. Human beings often make biased estimates of the risks they face, and therefore the need for regulation of a particular risk, as gauged by public sentiment, could likewise be overstated. The formulation of risk policy should begin by asking what outcomes would result from a well-functioning market where individuals behave to maximize their own expected utility. Policy makers must attempt to gauge the real magnitude of a market inefficiency before deciding whether or not to intervene. If regulators overreact as well, resources are expended without commensurate benefit.

This reasoning could apply to the mutual fund context. Misperceptions resulting from availability and status quo bias might be overstating the true

156 Id.
157 See Viscusi, supra note 83, at 562.
nature of the problem. The crash of a number of money-market mutual funds likely had the greatest impact; because investors tend to view these funds as "guaranteed," these loses represented unfamiliar risks susceptible to overestimation. Press coverage of all the mutual fund debacles in 1994 was relatively great, increasing availability of these events. In addition, as noted above, losses from mutual fund investment are also subject to overestimation due to loss aversion and aversion to regret.

In strict monetary terms, however, the losses are not staggering. The overall size of the mutual fund market is tremendous — the amount of money in only money-market funds has recently eclipsed $813 billion.\textsuperscript{158} Even a few hundred million dollars in losses is not outrageous against this figure. In addition, some of the investors who lost money in the debacles of 1994 were able to seek redress through the courts; Piper Jaffray investors, for example, reached a settlement on their misrepresentation claim.\textsuperscript{159} Of course, the next mutual fund to crash might not have the resources of Piper Jaffray, but the potential for other methods of addressing this problem must be considered when assessing benefits.

While the disasters of 1994 were not the only reason for the Concept Release, they were almost certainly the primary catalysts. The SEC should not necessarily be faulted; government agencies are subject to political pressures, and cannot necessarily "set their course in the direction indicated by dispassionate analysis of risks and overall benefits to society."\textsuperscript{160} When making the final decision, however, regulators should attempt to weigh the costs and benefits in an absolute sense.

\textsuperscript{160} Viscusi, \textit{supra} note 83, at 563.
V. Conclusion

This paper has sought to outline the various issues that should be considered by the SEC in their attempt to fashion a risk disclosure system. The one clear conclusion is that mutual fund risk is not only a difficult concept to measure and forecast, but also to convey and comprehend. Making decisions involving risks and probabilities pushes against the outer edges of our ability to think rationally. Therefore, a risk disclosure program must take account of these various problems. Deciding what to disclose is only half the battle.

While the difficulties of measuring and understanding risk push heavily against a mandated disclosure requirement, hopefully regulators will begin to more strongly consider the issues highlighted above in other contexts. Reading a prospectuses has been an impossible task for the average investor for far too long. Taking the time to make simple changes in organization and format in prospectuses, as well as other mandated disclosures, can greatly increase the effectiveness of disclosure, as measured by actual impact on peoples decisions. It is time for changes in behavior, as opposed to the sheer amount of information, to become the benchmark for successful regulation in this area.