Social Investing

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Capital Market Theory Perspectives

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by Randolph Westerfield*

INTRODUCTION

Modern portfolio theory usually assumes that individuals make investment decisions to maximize the expected utility of the monetary value of end-of-period wealth. This assumption is incompatible with social investing. Social investing refers to investing in securities that have desirable social attributes, such as firms employing union labor, or refraining from investing in securities that have undesirable social qualities, such as firms doing business in South Africa. There is widespread disagreement about how to define social investing and about whether social investing is appropriate for pension funds.

Nevertheless, several firms have directed their pension fund money managers to allow for such nonmonetary factors as employee health and safety compliance and equal employment opportunities in selecting a portfolio. Recently Corporate Data Exchange published a study purporting to show that many pensions' funds were investing in socially undesirable assets.[1]

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[1] Corporate Data Exchange, *CDE Handbook—Pension Investments: A Social Audit* (New York: CDE, 1979).

Social investing has the obvious effect of substituting nonmonetary considerations for monetary considerations in selecting investments. It follows that one of the potential consequences of social investing is for portfolios to have higher risk and (or) lower expected return than would otherwise be true, since preferred investments from a risk and expected-return standpoint could be sacrificed for social considerations.

Social investing could be viewed as proper if one takes the view that sacrificing dominant risk and expected-return investment for social considerations is a trade-off that pension plan beneficiaries should be able and willing to make, if pension assets are being held in trust for them as deferred wages in lieu of current wages. Legally, a firm's pension fund is separate from the firm. The fund's trustees presumably should act in the interest of the plan's beneficiaries. However, the performance of a corporate defined-benefit pension fund affects the firm and its stockholders much more than it affects the fund's beneficiaries. If the fund's performance is good, the firm's contributions will sooner or later be lower than they would have been, whereas if the fund's performance is poor, the firm's contributions will be higher than they would have been. Thus, pension fund performance directly affects the firm's cash flow value. Normally, the pension benefits are independent of the pension fund investment performance. Since gains and losses in the fund are borne, for the most part, by the firm, social investing will affect the firm as well as plan beneficiaries.

Social investing could be viewed as proper if the performance of the pension fund was not materially affected. It might be argued that any increase in risk or decrease in return is likely to be very small in financial markets with many assets and many equivalent risk-return opportunities as long as each asset is "fairly" priced. In contrast, it might be that investment opportunities with equal risk and expected return, but different social desirability, are very infrequent.

Devising a social investment policy that distinguishes between assets with different social attributes but, at the same time, minimizes the cost, requires a framework that can identify the risk and expected consequences of social investing.

This paper attempts to identify the cost to a pension plan of social investing, within a capital asset pricing model framework. Using the capital asset pricing model, a measure of the cost of social investing is developed. It is shown that the cost of social investing is associated with imperfect diversification, which will increase investment risk and (or) lower expected return when compared to what they would otherwise have been.

The capital asset pricing model (CAPM) postulates that individual investors hold only perfect diversified, efficient portfolios. Perfect diversification has a special connotation in the CAPM; it is a condition where a portfolio return distribution is perfectly, positively correlated with the return distribution of the market portfolio. It is shown that the cost of social investing can be cast as a function of the degree to which the correlation of the socially invested portfolio's return with the market portfolio is less than 1.

The paper shows that social investing will probably cause a portfolio to be imperfectly diversified when compared to what would have been. The cost of social investing depends upon the degree of imperfect diversification and the range of investment opportunities that remain after particular assets are excluded for social considerations. Furthermore, the paper argues that some of the cost of social investing will be borne by stockholders who hold the equity of the plan sponsor engaging in social investing (i.e., the firm) and the magnitude of the cost will depend upon the diversification of their personal portfolios.

The second section of this paper describes the CAPM with the specific objective of setting the stage for an analysis of social investing. In the third section, a measure of the cost of social investing is derived. The cost of social investing is put in terms of passive and active investment policies in the fourth section. Several sensible and dubious reasons for social investing are put forth and discussed in the fifth section. A summary of the major conclusions is put forth in the sixth section. An appendix contains a short discussion and case study of how to estimate the cost of social investing.

The CAPM

The Portfolio Problem: Idealized Case

The portfolio problem of each individual is to allocate current wealth between various risky and riskless assets available to be bought by the individual. The individual's wealth next period will be uncertain, and the degree of uncertainty will be a function of how the allocation of present wealth is made. The individual is assumed to choose a portfolio today (t) that maximizes expected utility next period ($t + 1$), given the amount of wealth (Y_t) to be invested today. The individual's utility next period is assumed to depend *only* upon his wealth next period (Y_{t+1}), i.e., $U = U(Y_{t+1})$, where $U(Y_{t+1})$ is the utility of Y_{t+1}.

This last statement conveys the idea that individuals buy assets considering only the possible returns. In ths setting, an investor will not value a firm less highly if the firm is doing something the investor would not do on his own account. It rules out "social" investing.

Rate of Return

Dividing the wealth next period by the initial amount invested and subtracting 1, gives the percentage rate of return on the individual's portfolio.

$$R_{t+1} = \frac{Y_{t+1}}{Y_t} - 1$$

Assume that we are interested in calculating the returns realized over a period of a month. Let P_t be the price of a risky asset at the beginning of month t. P_{t+1} will then be the price at the beginning of the next month. Let C_t be the cash flows produced by the asset and payable to its owner within the month t. If the asset is a share of stock, these cash flows will be dividends. If the asset is a bond, these cash flows will be the coupon payments. If one buys the asset at the beginning of month t and sells it at the beginning of month $t + 1$, one realizes a return of

$$\text{return} = R_{t+1} = \frac{P_{t+1} + C_{t+1}}{P_t} - 1$$

At the beginning of the month both the cash flows that will be received during the month (C_t) and the price the asset will fetch at the beginning of next month, may be uncertain. When a quantity is uncertain, a tilde (~) will be placed over its symbol. We will write

$$\tilde{R}_{t+1} = \frac{\tilde{P}_{t+1} + \tilde{C}_{t+1}}{P_t} - 1$$

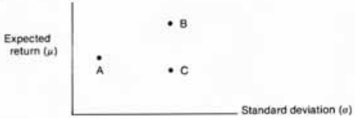
The only number which is known at the beginning of the month is the price, P_t. This means that the return is unknown.

The variance is the squared value of the expectation that the return will be different from the expected return. The standard deviation is the square root of the variance.

Consider the problem of an individual who wishes to choose the "best" portfolio possible in terms of the mean (i.e., expected return) and variance of its return. For this section, assume that there is no riskless asset available for investment—only risky asset combinations are possible now. In this situation, the only principle that all individuals can agree upon is that: (1) for a given level of variance (risk), all want the portfolio that gives the highest mean return, or, alternatively (2) for a given level of mean return, all want the portfolio that minimizes risk or variance of the return. Portfolios that satisfy (1) and (2) are called *mean-variance efficient portfolios* or, simply, efficient portfolios.

In Figure 7-1 we plot the expected returns and standard deviations of three portfolios.

Figure 7-1

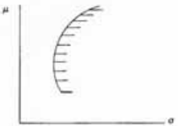


No rational investor will invest in portfolio C because both A and B have higher expected returns *and* lower standard deviations. Some investors may choose A. It gives a modest return without much risk. At the cost of accepting more risk (a higher standard deviation), an investor may achieve a higher expected return by investng in B.

Although all individuals can agree upon this principle, they may disagree when choosing a single portfolio due to their different reactions towards risk taking. Some may wish to take very little risk and have a relatively low expected rate of return, whereas others may wish to take large risks with commensurately large expected rate of return. This section finds the *set* of efficient risk-asset portfolios from which they can all agree to choose, not the single portfolio that any particular individual would choose from this set.

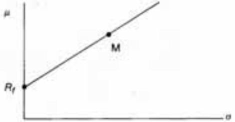
If there are many portfolios from which to choose, the set of all portfolios' means (μ) and the standard deviations (σ) is the shaded area of Figure 7-2, and the efficient set is the dark curve representing an edge of that area:

Figure 7-2



We have been considering only portfolios composed of risky assets. There are however, securities which are, for all intents and purposes, riskless. A Treasury bill is a good example. The return on a Treasury bill is not random, but known with certainty. The standard deviation of its return is zero. A portfolio composed only of Treasury bills will plot on our diagram (Figure 7-3) as R_f.

Figure 7-3



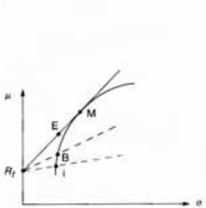
R_f is the known rate of return on Treasury bills. Assume that we give an investor a choice of investing some money in Treasury bills and some in a large portfolio of risky securities (e.g., a "market portfolio"). The opportunities are the loci of points connecting R_f and M.

Portfolio Choice with a Riskless Asset: The Capital Market Line

When there exists a riskless asset that individuals can invest in (borrow and lend with), the set of optimal portfolios for individuals is quite different from the efficient frontier derived previously. Indeed, it will be shown that, in this situation, all individuals will invest in only two portfolios that are unique. They are: (1) the market portfolio and (2) the riskless asset. *As far as optimal combinations of risky assets are concerned, only one is truly efficient with borrowing and lending at a riskless rate—the market portfolio.* The set of mean-standard deviation combinations that are efficient with this expanded opportunity set, form a straight line in $\mu - \sigma$ space, as will be shown. This line is called the capital market line, as it gives the relevant opportunity set available in the capital market.

The proof of the above assertions is easily seen in geometric terms, as presented now. Only one mathematical fact is needed for this proof: the locus of $\mu - \sigma$ combinations attained by investing an amount β in a given asset or portfolio p and a complementary amount $1 - \beta$ in the riskless asset, is a straight line in $\mu - \sigma$ space passing through the points $(0, R_f)$ and (σ_p, μ_p), where σ_p and μ_p are the standard deviation and mean of the given portfolio. Mathematically, for weights β on portfolio p and $1 - \beta$ on the riskless asset, we have: $\sigma = \beta\sigma_p$ and $\mu = \beta\mu_p + (1 - \beta)R_f$. Letting $\beta = 0$ and 1, respectively, gives the two point specified. Given this fact, examine the new opportunities available with riskless borrowing and lending in terms of geometry (see Figure 7–4).

Figure 7–4



First, consider borrowing or lending and investing in portfolio i on the graph. Depending on the amount borrowed or lent, $(1 - \beta)$, the new portfolio's mean and standard deviation will fall somewhere on the dashed line through i. Next, consider borrowing or lending and investing in portfolio B. Alternative $\mu - \sigma$ points for such portfolios will be on the dashed line through B. Note that this dashed line dominates the dashed line through i for investment purposes since, for every level of σ, it has a higher mean, μ. By continuing the analysis of $\mu - \sigma$ possibilities with all feasible risky asset portfolios (the shaded area), it is seen that borrowing or lending and investing in portfolio M, the tangent portfolio, dominates all other $\mu - \sigma$ combinations attainable, including the previously derived risky asset frontier.

Everyone should want to hold portfolio M. Portfolio M must include the risky assets in the proportions that they are in the market. Portfolio M must, in other words, be the market portfolio. Assume that portfolio M contains stock X whose fraction of the total market value is 1/100, but its value in the portfolio as a fraction of the total value of the portfolio is only 1/2000. If we look at the matter as an economist would, we would say that supply exceeds demand. The price of the stock (stock X) must fall. When the price of the stock falls, the expected return increases. This makes stock X more desirable, and investors will want to include more of it in their portfolios. If demand for stock X was insufficient, there must have been other stocks for which demand was excessive. For these stocks prices will rise, and expected returns will decrease. Where will this process end? It will end at the point where supply equals demand for all risky assets—it will end at the point where the portfolio at the point of tangency in our diagrams is the market portfolio. Now it can be shown mathematically that this point is reached when the expected return, μ_i, on each i^{th} asset conforms with the following equation:

$$\mu_i = R_f + \beta_i(\mu_m - R_f)$$

By μ_i we mean the expected value of R_i, i.e., $E(R_i)$, where R_i is the time-weighted return of asset i (and R_m is the time weighted return on the market portfolio), and μ_m is the expected return on the market portfolio. The only other symbol to be explained is β. This simply the slope of a regression line of best fit of R_i and R_m.

The market therefore allows an asset to have a return above the risk-free rate (R_f) if the asset has a positive beta. Beta is the measure of risk of the security or asset, and is equal to

$$cov(R_i R_m)/\sigma_m^2$$

$Cov(R_i R_m)$ is the covariance of R_i, and R_m and σ_m^2 is the variance of m. The rate of return on the market is expected to be greater than the rate of return on Treasury bills (R_f). This equation is called the capital asset pricing model.[2]

The capital asset pricing model states that the equilibrium expected excess return on any asset is proportional to the asset's covariance (or beta) with the market portfolio's return. The relevant measure of an asset's risk is its beta (or covariance).

The principal assumptions involved in this derivation are: (A1), homogeneous beliefs, (A2) existence of a riskless asset, (A3) no restrictions or penalties on short sales, (A4) perfect markets with no transactions costs, no taxes, and no cost of information, (A5) normality of all asset returns, and (A6) only one time period in the economy.

Social Investing and the CAPM

The CAPM is derived with an assumption of no "position constraints" (assumptions A3 and A4). Social investing can be thought of as a "solution" to the individual's portfolio problem when there are position constraints on security holdings. These position constraints are limits on the total amounts of any security which an individual may want to hold and can require exclusion or inclusion of assets compared to what would have been. With the existence of position constraints, the individual will not be able to invest in an efficient portfolio, i.e., a portfolio which is perfectly positively correlated with the market portfolio.

The cost of position constraints can be measured graphically with Figure 7-4. Consider portfolio i which includes no shares of firms that are socially undesirable. It has total portfolio risk $\sigma(R_i)$ equal to the market portfolio M and a lower expected return. The

[2] William Sharpe, "Capital Asset Prices: A Theory of Market Equilibrium under Conditions of Risk," Journal of Finance, September, 1974, pp. 425–42.

cost of holding portfolio i is the difference between the expected return on the globally efficient portfolio, M, and the expected return on portfolio i. This difference in expected returns will depend upon the correlation of returns for portfolio i and portfolio M, because it is the correlation of returns that determines the curvature of the efficient set of risky assets.

To show these results mathematically, suppose we assume $E(R_E)$ is the return on an efficient portfolio. The portfolio E is perfectly diversified in the CAPM sense; its return distribution is perfectly correlated with the return distribution of the market portfolio.

Next consider the portfolio i that contains assets that are underweighted or overweighted (when compared to E) because of social investing. Portfolio i will be a globally inefficient portfolio, and its return distribution will be imperfectly correlated to the return distribution of the market portfolio—or to the return distribution of any globally efficient portfolio.

If the CAPM holds, the return on portfolio i will be

$$E(R_i) = R_f + \frac{r(R_iR_m)\sigma(R_i)}{\sigma(R_m)}\,[E(R_m) - R_i]$$

where $r(R_iR_m)$ is the correlation of R_i and R_m. Note $cov(R_iR_m) = r(R_iR_m)\sigma(R_i)\sigma(R_m)$. The return on portfolio E will be, with $r(R_ER_m) = 1$, equal to

$$E(R_E) = R_F + \frac{\sigma(R_i)}{\sigma(R_m)}\,[E(R_m) - R_F].$$

Subtracting $E(R_i)$ from $E(R_E)$ yields

$$E(R_E) - E(R_i) = [E(R_m) - R_F]\,\frac{\sigma(R_i)}{\sigma(R_m)}\,[1 - r(R_iR_m)].$$

The term on the left-hand side of the above equation can be called the cost of an efficient portfolio in a CAPM world. It is the difference between the expected return of the i^{th} portfolio and the expected return of an efficient portfolio at a given level of portfolio risk. The magnitude of the difference is a function of the correlation coefficient. The quantity $\frac{\sigma(R_i)}{\sigma(R_m)}\,[1 - r(R_iR_m)]$ represents the increment of portfolio risk attributable to lack of perfect diversification, and the term $[E(R_m) - R_E]$ represents the expected return per unit of risk. It is quite clear that when $r(R_iR_m) = 1$, the cost of imperfect diversification is zero.

The cost of social investing will be a function of the degree to which it produces imperfect diversification, which depends upon the correlation coefficient $r(R_iR_m)$ of the socially invested portfolio.

Passive versus Active Portfolios

We have shown that in a setting where assets are priced according to the capital asset pricing model the cost of social investing will be connected with the increased risk and decreased expected return that came about from holding a less than perfectly diversified portfolio. Imperfectly diversified portfolios are referred to as inefficient and can be readily identified because they will have a correlation of returns with the market portfolio's return that is less than 1. In a CAPM framework, the cost of social investing is a function of magnitude of imperfect diversification.

The CAPM provides a potentially useful theoretical framework. However, since the market portfolio cannot be readily identified, approximations must be introduced.

In the real world of portfolio management, a distinction is usually made between investment strategies that are passive—which applies holding a well-diversified portfolio with infrequent trading—and those that are active. Active portfolio management implies asset concentration and frequent trading.

The most extreme passive strategy is to hold a surrogate market portfolio. These surrogate market portfolios are usually referred to as index funds and presumably have very high correlation to the true (but unobserved) market portfolios. Passive managers do not try to "beat the market," and passive portfolios will usually exhibit very high correlation to surrogate market portfolios (e.g., Standard & Poors Composite Index) and have beta coefficients that are close to unity.

Active managers act as if they believe some assets are under or over priced when compared to the CAPM prices. They construct portfolios that have more-than-normal or less-than-normal proportions in groups of assets (e.g., growth stocks). Active managers construct portfolios which may have low correlation to surrogate market portfolios. Passive managers diversify, and active managers concentrate.

A passive portfolio can be thought of as the benchmark case which would be invested in if the money manager had no special information. The active manager can be thought of as starting with a passive portfolio and underweighting some assets and overweighting others. The decision to construct an active portfolio involves a risk-return, trade-off decision. An active portfolio will have greater risk than a comparable passive portfolio because it will be less diversified. However, the active manager expects higher returns.

Social investing is, in some respects, similar to active portfolio management. The decision to divest firms that are not socially desirable or to invest in assets that are socially desirable is one that will underweight some assets and overweight others when compared to a market portfolio and a passive investment strategy. It is analogous to an active manager who buys growth stocks and sells stocks with large capitalization because he thinks they are mispriced.

Assessing the cost of social investing would involve comparing the correlation coefficients of socially invested portfolios with those which could have been attained with passive portfolios. This is no easy task because in typical portfolio management social investing will be mixed with active investing.

The impact of social investing on the correlation coefficient is difficult to predict because it will depend upon one's assumption about the variance-covariance matrix of the market for risky assets and the type of underweighting and overweighting that is required to take into account social investing. If social investing strategies were to involve the forced exclusion of certain assets, the impact might be different than if it involved the forced inclusion of certain assets.

Suppose the plan sponsor prohibits a money manager from investing in certain assets. The important portfolio management question is: can the resulting portfolio closely resemble the market portfolio? More specifically, can a manager from the assets remaining, form a portfolio that is highly correlated with a surrogate market portfolio. The answers depend upon whether the position constraints tend to make it impossible for the money manager to weight the remaining assets to compensate for the excluded assets.

To sum up, the following procedure could be used to asses the cost of social investing:

1. Choose a surrogate market portfolio. This portfolio should include the universe of securities deemed relevant for pension fund investments. Create an index from these securities that embodies a passive investment strategy. The index should be a value-weighted portfolio with only those transactions required to maintain the basic features of the surrogate market portfolio.
2. Exclude all the assets that are considered socially undesirable.
3. From the remaining assets, identify the most efficient portfolio (assuming a risk-free return).
4. Compute the correlation of returns of the efficient portfolio including only socially desirable investments with the returns of the surrogate market portfolio.
5. Compute the cost of social investing as

$$[E(R_m) - R_f] \frac{\sigma(R_i)}{\sigma(R_m)} [1 - r(R_i R_m)]$$

where portfolio i is socially invested and portfolio m is the surrogate market portfolio.

Caveat

A CAPM framework for evaluating the costs of social investing has been put forth. There are several reasons to believe that these costs will be small.

Social Investing May Not Reduce Diversification in Pension Funds

Social investing will reduce the potential universe of assets that pension funds can invest in yet may not reduce the amount of effective diversification. It is easy to imagine a set of conditions in the financial markets where hundreds of assets could be excluded from consideration on purely social grounds, but produce no material decrease in the degree of diversification in pension fund portfolios.

Suppose the return on each risky asset, i, can be written as

$$\tilde{R}_i = a_i + b_i \tilde{R}_m + \tilde{e}_i \qquad i = 1,2, \ldots, N$$

where a_i and b_i are parameter constants. $\tilde{R}_m$ is the rate of return on the market portfolio and

$$\mathrm{cov}(\tilde{e}_i \tilde{e}_j) = 0 \qquad \text{for all } i \neq j$$
$$\mathrm{cov}(\tilde{e}_i \tilde{R}_m) = 0.$$

This equation breaks down the return of an asset into two components: that part due to the market $(a_i + b_i\tilde{R}_m)$ and that part independent of the market $(\tilde{e}_i)$. This is one of the most widely accepted models in finance.[3]

One of the implications of this model is that social investing will possibly have negligible cost due to imperfect diversification. In fact, all equally weighted portfolios with more than 100 assets will be virtually perfectly diversified. This model, usually referred to as the market model (or single-index model), implies that an investor can form a portfolio by placing equal amounts in *any* 100 assets and have a correlation with the market equal to approximately 1. The correlation of returns increases so rapidly that it approaches 1 for even moderately sized portfolios.

The single index model is an approximation to the real world and probably understates the cost of social investing from imperfect diversification. Single index models assume a single source of covariance between securities, and thus, all the benefits from diversification can be gained after a limited number of assets have been added to the portfolio. If additional market sources of covariance between securities are introduced by adding additional market influences in the return-generating equation, adequate diversification will require more assets and more careful weighting.

If portfolios having large numbers of securities are concentrated in a small fraction of the total, the level of diversification may be deceptively low. A portfolio consisting of 20 securities can be as diversified as one with 100 securities depending upon the weights assigned to each one. Therefore, a socially invested portfolio with 50 percent of its assets in a single type of investment, e.g., mortgage bonds would lack a great amount of diversification—even if the market model were true.

[3] Eugene Fama, *Foundations of Finance* (New York: Basic Books, 1976), chaps. 3 and 4.

Plan Beneficiaries Are Not Affected by Social Investing[4]

The majority of employer-sponsored pension plans are known as defined-benefit plans—they promise the participant so many dollars a year at retirement or a specified percentage of his (or her) final wage. These promised benefits are liabilities to the plan and, indirectly to the firm. In principle the present value of the pension liabilities is independent of the value of the assets in the pension funds or the other asset of the firm.

It could be argued that pension funds represent assets held in trust for pension plan participants and their beneficiaries in lieu of current wages. If the pension plan participants are willing to accept higher risk and lower expected return from social investing, they should be allowed to do so. Of course, while pension benefits can be thought of as deferred wages, they are defined by a benefits formula and partially guaranteed by the Pension Benefits Guarantee Corporation. The pension liabilities do not change with a decrease in the value of pension assets. If a pension plan is terminated with insufficient assets, the Pension Benefits Guarantee Corporation will make up most of the difference. This seems to make pension liabilities not only like senior debt, but virtually risk free. If changes in the value of pension plan assets have little to do with whether plan participants are paid or not, it follows that social investing will not materially affect plan participants.

The Cost of Social Investing Falls on the Stockholders of the Plan Sponsor

Stockholders in the firm of the plan sponsor are most affected by the performance of pension fund investments. If the pension fund's performance is good, the value of the firm stock should increase. The effects of changes in the value of the pension fund's investment will probably be quickly reflected in the value of the firm's stock price. An extra dollar earned in the pension fund investments means a dollar that the firm will not have to contribute. In fact, so long as the pension benefits formulas are not changed, a change in the value of the pension fund is the

[4] Jack L. Treynor, Patrick J. Regan, and William W. Priest, Jr., *The Funding Reality of Pension Funding under ERISA* (Homewood, Ill.: Dow Jones–Irwin, 1976).

present value of the change in the future contributions—no matter how long the firm waits to make the change.

Greater risk in pension fund assets will mean greater risk in the present value of the firm's contributions, and greater risk to value of the stockholder investment in the firm. Legally, a firm's pension fund is separate from the firm. Financially, it is almost as though the pension fund is an asset of the firm. Changing the risk of the pension fund investments will change the risk of the firm's assets.

If a firm invests its pension fund assets in socially desirable investments, it may reduce the pension fund diversification. If a pension fund is not perfectly diversified, it will have greater risk than would be true otherwise. The firm's stockholders may suffer because the firm's stock will be less diversified. However, investors who hold the firm's stock as part of a larger portfolio will not be sensitive. If a pension fund of firm Y will not invest in stock X because of social considerations, stockholders of firm Y can invest in stock X on their own.

Other considerations in assessing the costs of social investing would include the transactions costs associated with trading due to social considerations, management costs associated with trying to identify and agree upon investments that appropriately take into account social considerations, the costs of indirect subsidy, and conflicts of interest when pension assets are directed toward investments that are tied to the economic interests of the same plan participants.

Conclusions

The cost to a pension fund of social investing, within a capital asset pricing model framework, is the extent to which it causes imperfect diversification—and the concommitant increase in risk and (or) lower expected return. This paper has identified a measure of the cost of social investing which depends upon the correlation of returns of the socially invested portfolio to the returns of the market portfolio.

The paper has put forth several reasons to believe that, in a CAPM framework, the costs of social investing will be small. Social investing will reduce the potential universe of assets that a pension fund can invest in and cause pension funds to be less diversified than would be otherwise true. The paper shows that under a set of plausible assumptions the reduction in effective diversification should be minimal.

Pension plan participants are not much affected by social investing in typically defined benefit pension plans. In principle, the present value of pension liabilities is independent of the value of the assets in the pension funds. The stockholders in a firm are most directly affected by the performance of the pension fund investments. Thus the costs of social investing will be borne primarily by a firm's stockholders. Social investing could cause comparatively greater risk in pension fund assets through imperfect diversification which could mean greater risk in the value of the firm contributions to the pension fund, and greater risk to the value of the stockholder investment in the firm. However, if the stockholders hold the firm's stock as part of a much larger portfolio, they will not be much affected by social investing.

Potentially important considerations in assessing the costs of social investing are the transactions costs from trading due to social investing and management costs in monitoring social investing. These costs have not been included in the present analysis. It is also possible that social investing will involve the acquisition of assets that are priced too high when compared to the capital asset pricing model implied price. In this case, social investing could involve a subsidy to the seller of the asset. The risk-expected return consequences of this type of social investing have not been considered in the paper.

Appendix

The Case Of Pax World Fund (PWF)

Pax World Fund is an open-end investment company, started in 1971 to do social investing. The fund, currently, has close to $4 million of asset value—invested primarily in common stocks. The fund is concentrated in agriculture, housing, and other basic-needs type industries. It avoids investing in the common stock and bonds of firms that do business in liquor, gambling, weapons, and defense contracts.

The purpose of this section of the paper is to evaluate the overall investment performance, including the cost of social investing, of Pax World Fund in the CAPM framework previously set forth. The analysis is not detailed. It is intended to be illustrative and to identify some of the problems of quantifying the cost of social investing.

Returns

The basic determinant of investment performance is the time-weighted return. The time-weighted return is based upon the total asset value of a fund each time a cash flow occurs. It measures the fund performance on the money under management during a particular period of time without extraneous influences due to timing of cash flows not under direct control.

The performance assessment contained in this section covers a period of seven years, from January 1975 to December 1981. A time-weighted rate of return has been calculated for each year. For comparison purposes, time-weighted rates of return have been calculated for the Standard & Poor's Composite Index of common stocks and Treasury bills of one year-maturity. They are reported in Table 1.

The essential idea underlying the performance measurement contained in this appendix is to compare the returns obtained through the social investing of Pax World Fund with those of appropriate alternatives. In this case, the primary focus is on the S&P Composite, which can be thought of as unmanaged portfolio and, hence, embodies completely passive management, i.e., the S&P Composite does no social investing and holds no Treasury bills. Several observations can be made from the data in Table 1.

Table 1
Annual Returns*

Year	*PWF*	*T Bills*	*S&P Composite*
1981	1.0%	13.8%	−4.9%
1980	16.0	12.6	32.5
1979	18.2	10.7	18.6
1978	.3	7.0	6.5
1977	2.0	8.2	−7.3
1976	23.3	6.1	23.7
1975	32.0	7.1	37.3
Average	13.7	9.6	15.3

* Time weighted returns, adjusted for dividends, coupons, and other income.

1. The average return of the PWF during the period was 13.7 percent, and the average return of the S&P Composite index was 15.3 percent.

2. This comparison shows that an investment in the S&P Composite Index would have obtained a higher average return over the period than an investment in the PWF. This is somewhat surprising since investments in market indexes embody completely passive strategies. Passive management means holding securities for long periods of time and very infrequent trading. Passive managers act as if security markets are efficient, and they do not try to beat the market.

Can we conclude that the Pax World Fund has performed poorly? Not necessarily. There are three possible explanations for the comparatively low returns.

a. The low returns may well have been due to bad luck. This is probably not a good reason for the low returns because good luck and back luck tend to cancel out in the long run. Performance measurement covering seven years should not be greatly influenced by luck.

b. Risk and return are generally positively related and the comparatively low returns obtained by the Pax World Fund may reflect the low risk of the fund. It follows that some way must be found to account for differences in PWF's exposure to risk when compared to the amount of risk inherent in the S&P Composite index.

c. The comparatively low returns of fund A could suggest inferior selection and timing of investments due to active investing or (and) social investing.

Risk and Diversification

The analysis of risk utilizes excess returns. Excess returns are the returns earned in excess of the return available on a risk-free asset such as one-year Treasury bills. It is the premium for investing in risky assets. Two measures of *ex post risk* are used as surrogates of the *ex ante risk* exposure of the fund. The standard deviation of yearly excess returns serves as an estimate of the fund's average exposure to total risk over the seven-year period covered.

The excess returns of a fund are also compared to those of a market index to determine the fund's average beta level during the period. The average beta reflects how sensitive a fund's returns are to a change in the relevant market index return—a beta value of 1 is average.

The market index used to compute the beta is the S&P Composite Index. The statistical method is to use ordinary least squares.

Diversification is another important part of portfolio management. The correlation of returns of a fund with the returns of a highly diversified portfolio is a basic measure of the extent to which the fund is diversified. The correlation of returns of PWF with the returns of the S&P Composite is a measure of the extent to which the investments of the PWF are as diversified as those in the S&P Composite Index. The closer the correlation is to +1, the greater is the degree of diversification. Recall that social investing can impair diversification.

Table 2 portrays the standard deviation and average beta coefficient of yearly excess returns for PWF during the period, and compares these measures of risk to the S&P Composite Index. The PWF had an average beta of .68, compared to 1 for the S&P Composite Index, indicating low risk. The standard deviation was 13.7 percent when compared to 18.5 percent for the S&P Composite.

These calculations all point to the conclusion that the risk exposure of the PWF was lower than average.

The amount of diversification obtained by the PWF was high.

Table 2
Pax World Fund (Excess Returns %)

Year	*S&P Composite*	−	*T Bill*	=	*Market Excess*	*PWF*	−	*T Bill*	=	*PWF Excess*
1981	−4.9	−	13.8	=	−18.7	+1.0	−	13.8	=	−12.8
1980	32.5	−	12.6	=	19.9	16.0	−	12.6	=	4.6
1979	18.6	−	10.7	=	7.9	18.2	−	10.7	=	7.5
1978	6.5	−	7.0	=	−0.5	.3	−	7.0	=	−6.7
1977	−7.3	−	8.2	=	−15.5	2.0	−	8.2	=	−6.2
1976	23.7	−	6.1	=	17.6	23.3	−	6.1	=	17.2
1975	37.3	−	7.1	=	30.2	32.0	−	7.1	=	24.9

Alpha	= .20
Beta	= .68
Correlation	= .92
Standard deviation (PWF)	= 13.7
Standard deviation (S&P)	= 18.5
Average excess return (PWF)	= 4.1
Average excess return (S&P)	= 5.7

The correlation coefficient of the PWF Fund with the S&P Composite Index was .92. The correlations indicate a high degree of diversification because they are very close to 1, the highest possible value. However, the standard deviation risk of the PWF is somewhat higher than would be true if it was perfectly diversified.

Overall Performance

The evaluation of portfolio performance is essentially concerned with comparing the return obtained on some portfolios with the return on other comparable portfolios. It is important that the comparison portfolios chosen are truly comparable. This means, among other things, that they must have similar risk.

Consider two portfolios—one with no risk and the other with substantial risk. Specifically, suppose you could invest in a portfolio of Treasury bills with no risk and a market index portfolio, e.g., the S&P Composite Index, with substantial risk. These portfolios embody passive investment strategies. Hypothetically, a portfolio manager could obtain any desired level-of-risk point by investing in the market index and mixing this with Treasury bills. If the manager wanted a low-risk portfolio, a mix with substantial weight in Treasury bills would be chosen, and if a manager wanted a high-risk portfolio, a mix with more weight on the common stock market index would be chosen.

If a manager's choice is to actively manage the fund, then one obvious measure of the manager's performance is the difference in return earned by actively managed funds and what would have been earned if the manager had passively invested in a market index of common stocks and Treasury bills to achieve the same risk level. The differential return is called *alpha* and is the actual return of the fund less the return of the portfolio with the same beta constructed from a mix of Treasury bills and a market index.

For example, recall the average return on the S&P Composite Index of common stock was 15.3 percent, and the return on Treasury bills was 9.6 percent. The beta of the S&P Composite Index is 1, and the beta of Treasury bills is 0. The beta of the total portfolio of the PWF was .68. A mixture of the S&P Composite Index and Treasury bills to obtain a beta of .68 would have a return of 13.5 percent. This 13.5 return is called the benchmark risk-adjusted return.

The actual return of the PWF was 13.7 percent. The benchmark risk adjusted return was 13.5 percent so that the alpha was 13.7% − 13.5% = +.2. It is clear that the PWF performed slightly better during the period than a passive strategy of investing in Treasury bills and common stocks at the same level of beta risk, which may indicate some selection and timing ability.

The cost of social investing can be computed from the data in Table 2. The market excess return during the period was equal to 5.7 percent, the ratio of standard deviations was $\frac{13.7\%}{18.5\%} = .74$, and the correlation coefficient was .92. It follows that the cost of social investing for the Pax World Fund was 5.7% × .74 × 1 − .92 = .34%. This means that the extra return required to compensate for the higher risk due to imperfect diversification was .34 percent.[1]

This cost can be compared to the alpha of .20 percent from which an over-all measure of performance can be calculated. The over-all measure combine the alpha and the cost of social investing due to imperfect diversification. Recall that the alpha was defined as a measure of the management's contribution to investment performance through asset selection, i.e., the choice of individual investments, the timing of purchases and sales, and the maintenance of industry weights different from that implied by the S&P Composite. A positive alpha indicates a net contribution to performance by the manager. Thus, if the alpha is added to the cost of social investing, the gains from asset selection are weighed against the cost of imperfect diversification. This calculation yields .20 − .34 = −.14%.

Conclusions

1. The return of the Pax World Fund was below the S&P Composite during the period.
2. The risk exposure of the Pax World Fund was below the S&P Composite during the period.

[1] This calculation of the cost of social investing assumes all the imperfect diversification ($R < 1$) is caused by social investing. This assumption is not likely to be exactly correct.

3. When the returns are adjusted for beta risk, the performance of the Pax World Fund is slightly above average.
4. The assets of the Pax World Fund are imperfectly diversified, implying a slight cost of social investing from higher standard deviation risk than would otherwise be true.
5. The risk-adjusted returns performance of PWF, as measured by alpha, almost exactly offsets the cost of social investing.