



Valuing Partial Interests in Trusts and Assessing the Prudent Investor Standard

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I. Introduction

Trust law has undergone a major revision over the last thirty years, and with it has changed the expectations on trustees when choosing trust assets and distributions.² Previous trust law had, either explicitly or through its interpretation of the prudent investor standard, effectively banned the inclusion of ‘speculative’ investments in a trust portfolio, in particular limiting exposure to stocks. In contrast, current trust law reflects modern portfolio theory, allowing riskier assets, but imposing on the trustee a duty to diversify the trust portfolio as a whole. While this revision makes economic sense and allows trustees to select optimal portfolios for their beneficiaries, it also greatly complicates assessment of the prudence of investment decisions.

In particular, by removing the ban on speculative investments, courts cannot

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² As reflected in the *Restatement (Third) of Trusts* (first published 1992, last revised 2005), Uniform Prudent Investor Act (1994), and the Uniform Trust Code (first published 2000, last revised 2005).

simply look for particular assets in a trust’s portfolio to determine if a trustee has breached his or her fiduciary duty. Like the trustees themselves, courts must consider “...investments not in isolation but in the context of the trust portfolio and as a part of an overall investment strategy, which should incorporate risk and return objectives reasonably suitable to the trust.”³ This means evaluating particular investment decisions in light of the wishes of the trust settlor and all partial interests, including both income and remainder beneficiaries—no simple task.

This is especially difficult because the financial interests of a trust’s beneficiaries are often diametrically opposed. Income beneficiaries who are entitled to distributions of trust income will want the trustee to select investments which pay greater dividends and interest at the expense of capital appreciation which benefit remainder beneficiaries. Not surprisingly, conflict among trust beneficiaries is common. Although applicable law requires that trustees adhere to lofty standards of “good faith” and “fair dealing” they must make tangible, specific decisions, and sometimes under circumstances in which the settlor’s expectations regarding investments and distributions as set forth in the trust document are unclear.

Traditional methods for valuing partial interests in trusts offer insufficient guidance to courts in assessing the prudent investor standard, as they often disregard many of the important factors which go into investment decisions—notably, the allocations to different asset classes. These traditional methods have not been updated along with trust law to reflect modern financial thinking, and can lead to serious errors in the assessment of trustee behavior.

In this paper, we develop a valuation methodology based on Monte Carlo simulation techniques which allows for economically feasible *ex ante* valuation of partial interests in trusts. The MCS technique is a widely used in modern finance and economics, and is especially useful for valuing partial interests because it can incorporate mortality risk, portfolio asset allocation, varying distributions and the discretionary sale of the trust’s assets to fund distributions. We explain how the MCS method can incorporate a variety of assumptions about the income beneficiary’s mortality and the trustee’s decisions, and show how these factors affect the valuation of partial interests. The MCS method provides more definitive guidance to both trustees contemplating investment and distribution choices and courts reviewing such conduct in connection with the trustees’ duty of impartiality or other aspects of the prudent investor standard.

II. The Prudent Investor Standard

A. Historical Context

Early legal restrictions on a trustee’s investment selection took the form of lists of allowable investments. The legal-list approach provided a safe harbor for trustees, but

³ (The American Law Institute, 1992)

was severely restrictive, essentially forcing the trustee to purchase only government-backed bonds whose long run returns were not high enough to keep up with inflation.⁴ However, it had the distinct advantages of being unambiguous in its guidance to trustees and easy to apply in cases regarding trustee liability.

American courts abandoned the legal-list standard beginning in 1830 with the *Harvard College v. Amory* decision, which adopted a more flexible ‘prudent man’ rule: trustees were required to “observe how men of prudence, discretion and intelligence manage their own affairs, not in regard to speculation but in regard to the permanent disposition of their funds, considering the probable income, as well as the probable safety of the capital to be invested.”⁵ While the prudent man rule offered trustees more discretion in choosing income-generating investments with reduced potential for liability, this flexibility eroded over time as courts declined to adopt specific criteria for prudent investing. Indeed, the courts even found trustees liable for “speculative” investments purchased in otherwise diversified portfolios. These investments included stocks purchased on margin, discount bonds, and even real estate—assets that by the 20th century were considered acceptable in some instances.⁶ Essentially, courts reverted back to an implied legal-list approach which only included the most conservative of assets, as such an approach deflected the question of how to determine whether a specific investment decision was prudent or imprudent.

Fortunately, in the latter half of the 20th century, modern portfolio theory gained widespread acceptance in finance and economics and allowed for a more precise analysis of the effect of higher-risk, higher-return assets on a portfolio as a whole. Given the obvious restrictiveness of the prudent man rule as it had been interpreted by the courts, trust law was significantly revised in the early 1990s to incorporate modern portfolio theory and allow trustees to construct more efficient investment portfolios.⁷ Not only did these new rules abandon any specific prohibitions against ‘speculative’ investments, but they imposed on the trustee a positive duty to diversify the portfolio as a whole. As noted by Rachlinski, “this new doctrine is designed to restrain courts from singling out individual investments in a portfolio that have performed poorly without assessing the role that these investments played in the portfolio’s diversification scheme.”⁸

While these changes reflect a major reinterpretation of the responsibilities of trustees for their investment decisions, like their predecessors, the new rules offer little specific guidance on how to evaluate whether an investment decision satisfies the standard. Section 227 of the *Restatement (Third)* outlines the General Standard of

⁴ See reviews in (Rachlinski, 2000) and (Sterk, 2010).

⁵ (*Harvard College and Massachusetts General Hospital versus Francis Amory, 1830*) also quoted in (Rachlinski, 2000).

⁶ This topic is treated extensively in (Gorden, 1987), which justly asks: “How did a rule named for the ‘prudent man,’ with its connotations of wisdom and judiciousness, become a constraint that discourages trustees and other fiduciaries from making investments now regularly favored by prudent investors?”

⁷ See Footnote 2.

⁸ (Rachlinski, 2000)

Prudent Investment and states in its entirety:

The trustee is under a duty to the beneficiaries to invest and manage the funds of the trust as a prudent investor would, in light of the purposes, terms, distribution requirements, and other circumstances of the trust.

- (a) This standard requires the exercise of reasonable care, skill, and caution, and is to be applied to investments not in isolation but in the context of the trust portfolio and as a part of an overall investment strategy, which should incorporate risk and return objectives reasonably suitable to the trust.
- (b) In making and implementing investment decisions, the trustee has a duty to diversify the investments of the trust unless, under the circumstances, it is prudent not to do so.
- (c) In addition, the trustee must:
 - (1) conform to fundamental fiduciary duties of loyalty (§ 170) and impartiality (§ 183);
 - (2) act with prudence in deciding whether and how to delegate authority and in the selection and supervision of agents (§ 171); and
 - (3) incur only costs that are reasonable in amount and appropriate to the investment responsibilities of the trusteeship (§ 188).
- (d) The trustee's duties under this Section are subject to the rule of § 228, dealing primarily with contrary investment provisions of a trust or statute.⁹

Commentators have noted that the new rules—being more vague than the standards they replaced—effectively absolve trustees from most forms of liability and create strong incentives to increase the riskiness of trust portfolios.¹⁰ Published empirical research has found that after the adoption of the new prudent investor rule trustees began allocating a significantly larger percentage of their portfolios' holdings to riskier assets.¹¹ It has also been pointed out that because the prudent-investor rule is not (necessarily) applied to the process by which a trustee makes investment decisions, but rather to whether an investment portfolio constructed was suitable, diversified, and impartial, the current revised standard is just as susceptible to hindsight bias as previous standards—an investment that appears conservative at the time of purchase could appear wholly inappropriate in retrospect.¹² Therefore, while the new prudent investor standard is consistent with finance theory and modern investment management practice, trustees still lack adequate guidance to implement investment decisions which would unambiguously meet the standard without sacrificing long run returns. Without an objective assessment tool, trustees may, out of an abundance of caution, retreat back into an implicit legal-list interpretation of the standard.

⁹ (The American Law Institute, 1992)

¹⁰ (Sterk, 2010)

¹¹ (Schanzenbach & Sitkoff, 2005)

¹² (Rachlinski, 2000)

B. Attempts at Valuation

From a trustee's point of view, tradeoffs exist between distributing significant amounts of income to the income beneficiary and preserving trust assets for remainder beneficiaries, especially during periods of low interest rates, high inflation or declining investment values. The Restatement Third recognizes "that the balancing of competing interests and objectives are matters of interpretation and fiduciary judgment" and that factors such as the trust's terms (e.g. expressed or implied priorities regarding beneficiaries), expected duration, distribution requirements, whether the trustee can invade principal, etc. should be considered."¹³ Exactly how those factors should be evaluated in a standard, uniform, and reliable way is uncertain. What courts need in order to evaluate the riskiness of a portfolio or the impartiality of a portfolio decision is a means of valuing that portfolio, as well as each beneficiary's separate interest in it, with and without the scrutinized action by the trustee.

Current methods for valuing partial interests in trusts are wholly inadequate for this task.¹⁴ Some states have adopted a statutory 'straight-line' percentage method, whereby trust assets are divided along some predetermined fraction between the income beneficiary and remainder beneficiaries regardless of portfolio composition or distribution rates—and therefore, regardless of any portfolio decisions made by the trustee. More flexible, though similarly inadequate, is the tax valuation method, whereby the present value of a partial interest is at least a function of the age of the income beneficiary (which implies a percentage value based on actuarial tables). The tax valuation method recognizes that the life expectancy of the income beneficiary is a significant factor in the valuation of a partial interest in a trust; however, it simply values the assets of the trust at a particular date and applies the derived percentage, and does not account for the trust's assets or what their returns are likely to be over time. While modern portfolio theory has been codified into trust law, it has not been applied to the valuation of partial interests in trusts and this absence remains a serious impediment to the effective administration of trusts and fair resolution of disputes between beneficiaries and trustees or amongst beneficiaries.

C. A Way Forward

The fundamental variables of modern portfolio theory—expected returns and risk and correlations between assets' returns—are the subject of a tremendous amount of

¹³ (The American Law Institute, 1992) and (DiRusso & Sablone, 2005)

¹⁴ Partial interest valuation issues have arisen primarily in tax, elective share, and marital dissolution cases. Its prevalence in marital dissolution and surviving spouse cases "is due, at least in part, to the fact that a trust for life can satisfy the requirements under the qualified terminable interest property ('QTIP') exception for federal estate and gift tax marital deduction purposes" (Bloom, 1992).

theoretical and empirical research.¹⁵ A wide variety of models now exist for estimating the expected returns and risk of portfolios for varying asset allocations. These models use the properties of each asset as they are known at a given point in time to project the distribution of possible outcomes for the portfolio as a whole, and can therefore demonstrate the effects on a portfolio's range of possible future values given a change in asset allocation or risk/return profile of one or more assets. By incorporating mortality risk, these models can determine the likely distributions to both the income and remainder beneficiaries of a trust, as well as the changes in those distributions that might occur as a result of a trustee's action. Indeed, such models are required for an objective implementation of the revised prudent investor standard.

We propose a valuation technique based on Monte Carlo simulation that could offer just that mix of precision and flexibility with the aim of resolving this highly ambiguous aspect of trust law. Our valuation technique, derived from modern portfolio theory, allows trustees to invest prudently while differentiating between efficient and inefficient portfolios and between reasonable and unreasonably dissipative distributions. Assessments based on our technique would offer a more accurate means of evaluating a trustee's duty of impartiality between beneficiaries, while including all of the relevant variables (age, withdrawal rates, etc.) which could affect that decision.

III. Using Monte Carlo Simulation (MCS) to Value Partial Interests in Trusts

A. Overview of Monte Carlo Methodology

Monte Carlo simulation has been used in a wide variety of applications, including financial valuations, and is particularly useful when the future values of a process depend on random events such as the returns on investments.¹⁶ The essential idea behind Monte Carlo simulation is to draw many random 'paths' of that random process, calculate the resulting payoffs of each individual path, and average the results. If the probability distribution of the random process is correctly specified and enough random paths are drawn, then every significant outcome of the underlying process will be represented in the simulated results in proportion to the likelihood that those outcomes will occur. The average payoff calculated thusly is the expected payoff.

We have used this general approach to construct a model of trust distributions. At the core of our model is a simulation of many random paths of the trust portfolio's value over time. Along the paths, periodic distributions are made to the income beneficiary and then to the remainder beneficiary when the income beneficiary dies. Since the distributions to the income and remainder beneficiaries depend on the mortality of the

¹⁵ A field that began with (Markowitz, Portfolio Selection, 1952) and (Markowitz, Portfolio Selection: Efficient Diversification of Investments, 1959) and reviewed in (Bodie, Kane, & Marcus, 2005), amongst others.

¹⁶ See (Glasserman, 2003) for a review of financial applications.

income beneficiary, we explicitly model the income beneficiary's mortality risk based on his or her age. Different mortality tables can be used to reflect the income beneficiary's previous medical conditions or other factors that could affect his or her life expectancy without changing the underlying valuation method. This aspect of Monte Carlo simulation allows for flexibility in determining the value of claims of different beneficiaries and to assess the trustee's duty of impartiality based on the facts of each specific case.

This simulation-based approach has precedent in the trust literature. Collins et al. used Monte Carlo methods to generate return distributions for income and remainder beneficiaries under a variety of conditions and portfolio compositions.¹⁷ They demonstrate both the effectiveness of the method and the importance of incorporating distributions to the income beneficiary and the portfolio's asset allocation. However, they do not incorporate the mortality of the income beneficiary and do not reduce to present value the aggregate distributions to the beneficiaries. As we will demonstrate below, the age of the income beneficiary is an important determinant of the portion of the trust likely to be paid out to the income beneficiary and to the remainder beneficiary. It also has a significant impact on the sensitivity of the income and remainder beneficiaries' interest in a trust to the trustees' investment and distribution decisions. The Monte Carlo Simulation method's flexibility makes it an indispensable tool for valuing partial interests in trusts whether in the elective share, marital dissolution, or any other trustee impartiality context.

B. Portfolio Modeling

The present value of a trust's portfolio of stocks and bonds is simply the sum of cash flows to be received in the future, discounted by an appropriate factor to reflect the time value of money and the uncertainty surrounding future cash flows.¹⁸ For thickly traded securities, like most US stocks and bonds, observed prices are the current market's consensus value of the securities. Thus, the best estimate of the present value of future cash flows from a trust's portfolio of publicly traded stocks and bonds with a current market value of \$10 million is \$10 million. If this portfolio was held in a trust with only one beneficiary we could confidently value that beneficiary's interest at \$10 million regardless of whether the assets were stocks or bonds, whether the stocks paid dividends or not, and whether the bonds were junk bonds or US Treasury securities. Even if a trust had multiple beneficiaries, the task of valuing any beneficiary's interest would be simple if the beneficiaries had a pro rata interest in all cash flows regardless of when they were to be received.

Partial interests in trusts appear difficult to value because distributions to

¹⁷ (Collins, Savage, & Stampfli, 2001)

¹⁸ For simplicity we will refer to portfolios of stocks and bonds throughout this note. The method we discuss applies equally well to more complex real-world trust portfolios which may include many different types of assets in addition to stocks and bonds.

beneficiaries vary with the trust portfolio's future values and are subject to the mortality experience of the income beneficiary. However, valuing the income beneficiary's interest in a trust is conceptually only slightly more complicated than valuing a bond. First we need to specify what cash flows will be paid to the income beneficiary. The cash flows can be specified as a fixed amount in dollars, to grow with inflation to maintain a constant real purchasing power or as a percentage of the trust value as it evolves over time due to investment gains, losses and withdrawals. The cash flows can even be specified to account for the trustee's discretion to alter payments to the income beneficiary. Along each simulated path, distributions to the income beneficiary end and remaining assets are paid to the remainder beneficiaries when the income beneficiary dies. The simulated paths end at future dates according to the probabilities of death derived from standard mortality tables. Each path's distributions to the income beneficiary are discounted to the present and averaged with those of all other paths to calculate the value of the income beneficiary's partial interest in the trust. Once we have calculated the present value of the income beneficiary's interest, the value of the remainder beneficiaries' interest equals the current value of the trust reduced by the value of the income beneficiary's interest.

The evolution of a trust portfolio's value over time depends on the investment returns realized on the trusts' assets and on the distributions made by the trustee. We don't know what the investment returns will be in the future but we can use theory and data to forecast a range of likely returns given the trust's asset allocation and current market conditions. The likely range of future portfolio values is determined by the expected return on investments, the standard deviation or "volatility" of those returns, and the distributions.

The average (and expected) return to a portfolio of individual securities is a weighted average of the returns to the individual securities, where the weights are the fraction of the beginning portfolio value accounted for by each security. A security's returns fluctuate around its average returns and when any particular security is experiencing an above average return other securities are likely experiencing below average returns. Diversification allows investors to bear less risk while keeping constant the expected return of a portfolio because above average returns earned on some securities offset below average returns earned on other securities.

In the examples that follow, we will assume that the trust holds diversified portfolios of stocks and bonds and will specify the expected return and volatility based on how much of the trust's assets are invested in stocks and how much are invested in bonds as follows.

$$1) \text{ Expected Return} = w_{\text{bonds}} \times \text{Expected Return}_{\text{bonds}} + w_{\text{stocks}} \times \text{Expected Return}_{\text{stocks}}$$

The investment risk in a portfolio is typically measured by the standard deviation of the portfolio's investment returns. The risk is (approximately) the square root of the average squared difference between the observed daily returns and the average daily

return. While this sounds complicated, its interpretation is quite simple. Standard deviation captures how widely the possible returns are spread out around the average or expected return; returns that fluctuate widely have higher standard deviations (more risk) than returns that fluctuate less.

Again simplifying slightly, we assume for our examples that the trust's investment risk is a function of the trust portfolio's allocation between stocks and bonds, the volatility of diversified portfolios of stocks and bonds and correlation between returns to stocks and bonds. See Equation 2).

$$2) \quad \sigma_p = \left[w_{stocks}^2 \sigma_{stocks}^2 + w_{bonds}^2 \sigma_{bonds}^2 + 2w_{bonds} w_{stocks} \sigma_{bonds} \sigma_{stocks} \rho_{bonds,stocks} \right]^{1/2}$$

In our examples, we consider portfolios of varying allocations between stocks and bonds. Since stocks have higher expected returns and more risk than bonds, the greater the proportion of the portfolio invested in stocks the higher the trust portfolio's expected return and volatility. While a great variety of asset classes could be considered, this simple framework yields an easy intuition for the relationship between asset allocations and the riskiness of the portfolio.

IV. Example Results

A. Base Case Calculations

We assume in our 'base case' simulation that a 65-year-old income beneficiary withdraws 5% of a trust portfolio's value each year. In our example 25% of the trust's assets are invested in a diversified portfolio of stocks paying 2% per year in dividends with an 8% expected capital appreciation, and 75% of the trust's assets are invested in a diversified portfolio of bonds paying 6% interest. We also assume that stocks have 20% annualized volatility, bonds have 4% annualized volatility, and the correlation coefficient between the stock and bond returns is 0.5. Given the portfolio weights, expected returns, standard deviations and correlation coefficient assumed, the expected return on the portfolio is 7%: 5% income (dividends and interest), and 2% in expected capital appreciation.

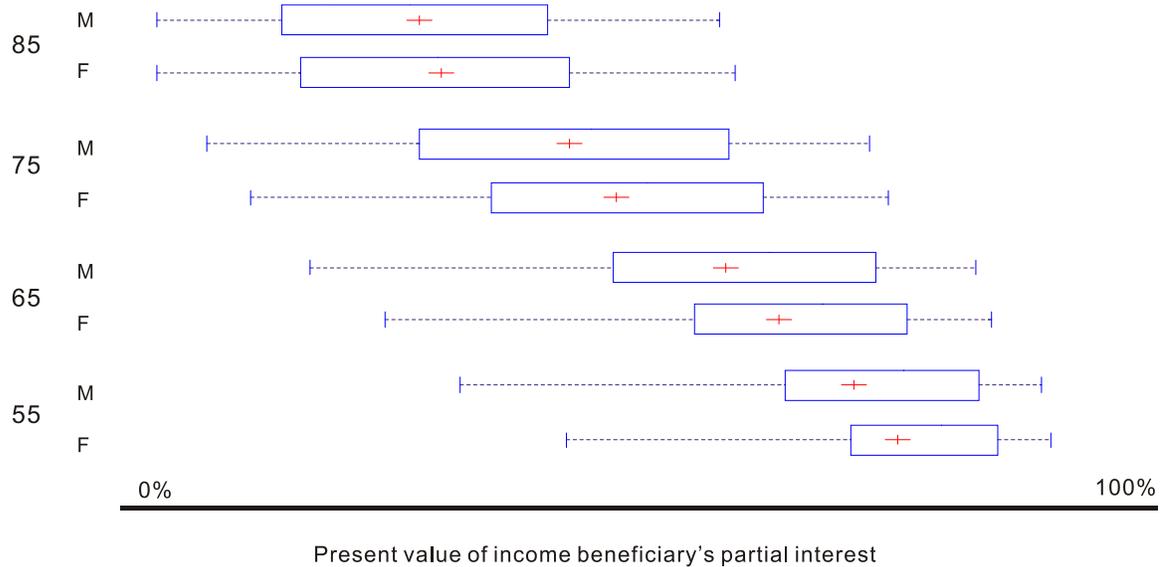
TABLE 1: Base Case

Assumptions			
Age of Income Beneficiary		65 years	
Annual Withdrawals		5%	
		<i>Stocks</i>	<i>Bonds</i>
Expected Return	10%		6%
	(2% dividends, 8% capital appreciation)		
Standard Deviation	20%		4%
Correlation Between Stocks and Bonds		0.5	
Portfolio weights	25%		75%
Calculated Portfolio Parameters			
Expected Total Return		7%	
Expected Annual Income		5%	
Portfolio Standard Deviation		7%	

Using the parameters in Table 1 and the IRS Table 2000CM mortality table, we simulate the payments to the income and remainder beneficiary 1,000,000 times and calculate the present value of the payments under each of the 1,000,000 iterations.¹⁹ In Figure 1, we plot the percentage of total trust distributions which are likely to be withdrawn by the income beneficiary, assuming various ages and both genders, as box and whisker plots.

¹⁹ The Monte Carlo simulation method is simple to implement and quick to run: our Matlab-based code runs the 1,000,000 simulations needed to create the analysis presented in the Figures in less than ten seconds on a standard desktop computer.

FIGURE 1: Distributions of Present Value of Partial Interests to Income Beneficiary by Sex and Age



The horizontal axis plots the expected present value of the distributions to the income beneficiary as a percentage of the trust's total value. We generate 1,000,000 possible outcomes for each age and gender combination and report summary statistics for the distribution of possible outcomes. The width of the boxes span the 25-75th percentile range, the whiskers extend to the 5th and 95th percentiles, and the red crosshairs identify the average. Since women have a slightly longer life expectancy than men, holding everything else constant, including asset allocations and distribution rates, a female income beneficiary receives slightly more in expected present value from a trust than a male income beneficiary of the same age. In our base case, the expected present value of distributions to a 65-year old female income beneficiary is \$633.32 per \$1,000 but only \$579.87 per \$1,000 if the income beneficiary is male. Thus given the assumptions in Table 1, if the income beneficiary is female, 63% of the expected present value of the trust is effectively committed to her, and 37% is committed to the remainder beneficiary.

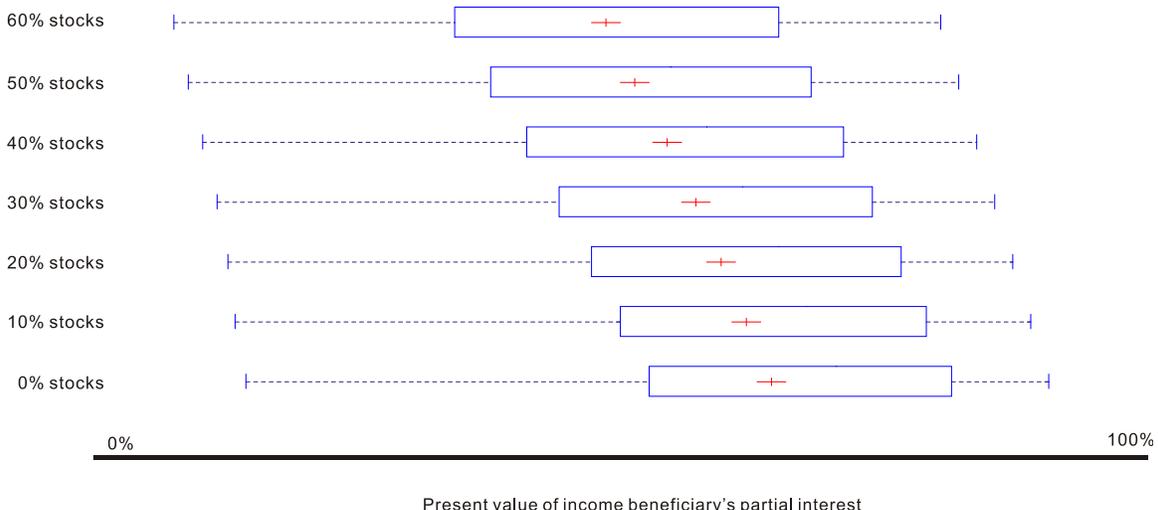
B. Varying Age

We can see in Figure 1 that the age of the income beneficiary has a substantial effect on the distribution of expected payouts to the income and remainder beneficiaries. The older the income beneficiary is on the valuation date, the smaller is the fraction of the trust's present value likely to be received by the income beneficiary and the larger is the fraction likely to be received by the remainder beneficiary. A 55-year-old male income beneficiary remainder beneficiary in our base simulation can expect to receive 76% of the present value of the trust but an 85-year-old male income beneficiary can expect to receive only 27% of the present value of the trust.

C. Varying Portfolio Asset Allocation

Figure 2 demonstrates the effect of varying the asset allocation between stocks and bonds on the expected present value of distributions to the income beneficiary as a percentage of the trust's total value. The expected returns and investment risk faced by the income and remainder beneficiary depends crucially on the risk characteristics of the underlying portfolio, suggesting that the trustee's choice of a well-diversified portfolio is a substantial determinant of resulting valuations. The expected return on the portfolio increases with its volatility, and both increase with the proportion of the trust portfolio invested in stocks in our examples. Both the income beneficiary's share of the trust's value as well as the variance of that share (represented by the 5% and 95% percentile bands) decrease with increasing allocation to stock. The distributions to the income beneficiary increase as the allocation to stock is reduced because the interest paid on bonds is greater than the dividends paid on stock and our base case assumes interest and dividends are distributed to the income beneficiary.

FIGURE 2: Distributions of Present Value of Partial Interests to Income Beneficiary by Allocation to Stocks

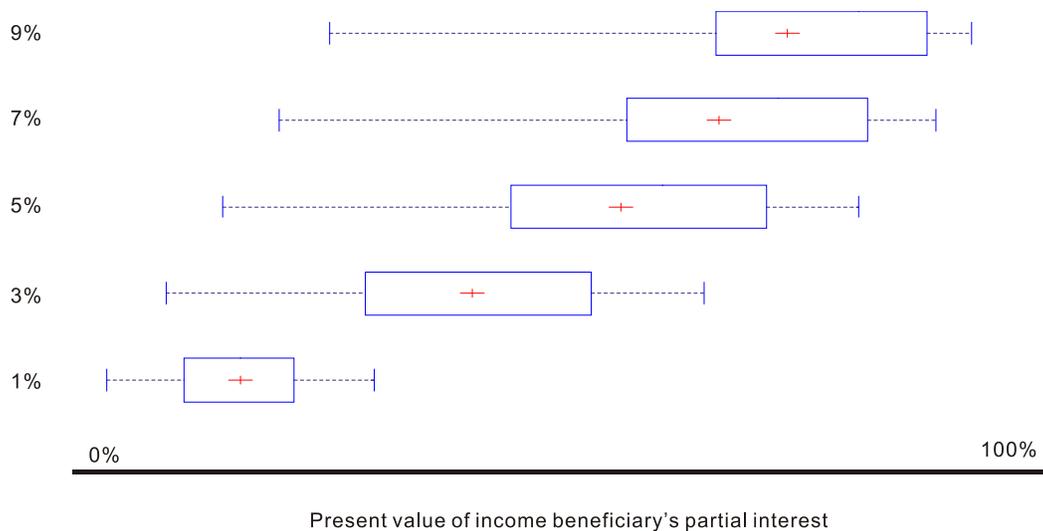


The Monte Carlo simulations also tell us something about the uncertainty surrounding the expected present value of the trust committed to the income beneficiary. In our base case, 50% (i.e., from 25th percentile to 75th percentile) of the possible present values of payments to the 65-year old female income beneficiary are between \$520 and \$767 per \$1,000 in trust value. If we maintain all the same assumptions in Table 1 including the 5% annual distributions and increase the allocation to bonds to 100%, the expected present value of the trust committed to the income beneficiary declines only slightly from 63.9% to 63.5%, but the range of outcomes covering half of the simulated paths is reduced to between \$543 and \$761.

D. Varying the Distribution Rate

Varying the percentage of the trust distributed each year to the income beneficiary has a dramatic effect on the resulting partial interest valuations. Figures 1 and 2 assumed a distribution rate equal to the 5% annual income generated by the portfolio's dividend payments from stocks and interest on bonds. Figure 3 shows the valuation of the income beneficiary's partial interest for various yearly distribution rates holding the portfolio's asset allocation and expected income constant. The outside whiskers are again 5% and 95% percentiles. At low distribution rates, the expected present value of the income beneficiary's distributions is quite low and the likely residual amount left for the remainder beneficiary at the income beneficiary's death is high. But as the distribution rate increases, the portion of the trust likely being distributed to the income beneficiary quickly increases such that at a 9% per year distribution rate, the income beneficiary receives 76% of the trust's present value in expected future distributions.

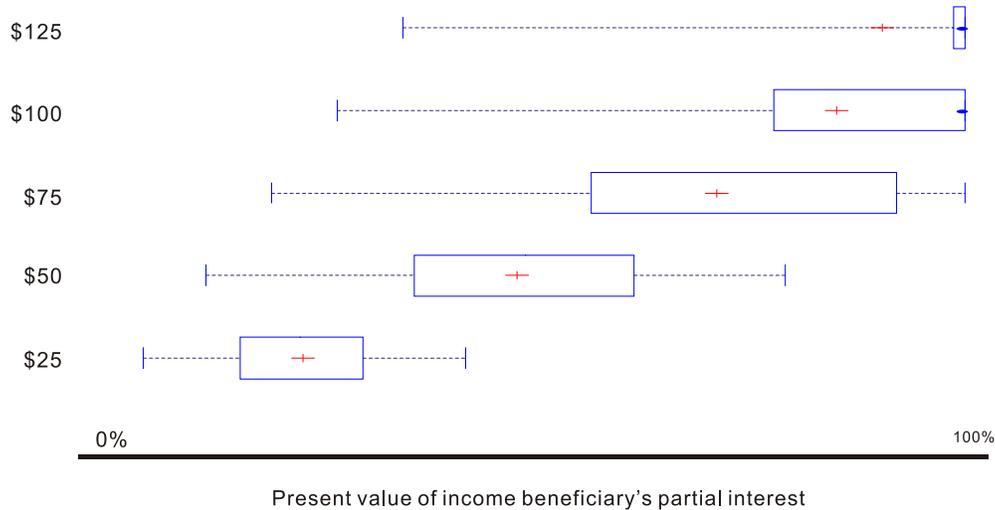
FIGURE 3: Distributions of Present Value of Partial Interests by Withdrawal Rate



Our examples so far have assumed that income beneficiaries receive distributions equal to a constant percent of the trust's value each year. Some income beneficiaries receive fixed dollar distributions per year rather than a percentage of the portfolio's value. Indeed, a constant dollar distribution is assumed by the tax valuation method. We can implement the Monte Carlo approach assuming a starting portfolio value of \$1,000 and a constant dollar distribution every year until the income beneficiary's death. In this case, the amount distributed to the income beneficiary is simply his or her life expectancy multiplied by the annual distribution amount. Figure 4 illustrates this scenario using our base case assumptions for age (65), gender (male), risk-free rate (5%), and portfolio composition. The income beneficiary's share of the trust increases rapidly with the fixed distribution amount. Fixing the distributions to the income beneficiary in dollar terms

instead of as a percent of the trust's value causes the remainder beneficiaries to bear most of the investment risk in the portfolio. With fixed distribution amounts, it is possible for the expected present value of the amount ultimately available to the remainder beneficiaries to be close to zero depending on the level of the distributions and the riskiness of the trust's portfolio...²⁰

FIGURE 4: Distributions of Present Value of Partial Interests by Fixed Withdrawal Amount



E. Discussion

The preceding examples demonstrate the ability of the Monte Carlo approach to incorporate factors that substantially affect the value of partial trust interests but which courts often do not include in their valuations. Our results suggest that simpler methods, such as attributing a constant fraction of a trust's value to the income beneficiary, substantially understate this complexity and will very likely err in the calculation of the relative value of each beneficiary's partial interest. For example, assuming that an 85-year-old income beneficiary and his remainder beneficiary are likely each to receive 50% of the trust value is mistaken, as the former beneficiary's age and gender imply a sufficiently short remaining life expectancy such that the income beneficiary is likely to receive far less than 50% of the trust's value. On the other hand, a healthy 44-year-old female income beneficiary is likely to receive far more than 50% of her trust's present value. The method we have outlined would allow courts to more accurately distinguish between the value of an 85-year-old male income beneficiary's partial interest and the value of a 44-year-old female income beneficiary's partial interest.

The Monte Carlo simulation method most closely resembles the tax valuation

²⁰ While we consider here only constant dollar withdrawals, it is easy to incorporate a withdrawal amount that increases with inflation such that the yearly withdrawals by the income beneficiary are constant in real dollar terms.

approach, which accounts for income beneficiary age using standard mortality tables and life remainder factors. However, the MCS method yields a distribution of expected values for both beneficiaries and can be used to assess the inherent risk of a trust investment, not just its expected value. This is a critical difference, as understanding the risk of various investments and the impact of distribution decisions by the trustee can be crucial in assessing whether trustees meet their duty of impartiality or prudent investor standard. The Monte Carlo Simulation method can accommodate different assumptions regarding portfolio asset allocations, and levels of diversification by modifying the portfolio volatility parameter. In addition, the medical history or personal health of the income beneficiary can be taken into account by using an alternative mortality table or tables modified based on statistical distributions of the life expectancy given certain conditions (smoker/nonsmoker, family histories, etc.). Our approach allows us to incorporate many factors which can impact the valuation of the future payments to the income beneficiary and measure the potential effect of proposed trustee investment and/or distribution decisions on the income and remainder beneficiaries' interests in a trust.

V. Applying MCS to Assess Prudent Investor Standard

A. An Example Breach of Duty of Impartiality Dispute

In *Merritt v. SunTrust Bank*,²¹ the remainder beneficiaries brought suit alleging that the trustees had breached their fiduciary duties by not insuring that the value of the trust's assets grew at a rate that met or exceeded inflation.²² The trust at issue was one of three trusts that Martha Hynds established for her three children. Each trust was originally funded with approximately \$675,000 and provided income for life to a child, with the remainder to pass to his or her descendants. Martha's son William, who was the income beneficiary of his trust, served with SunTrust Bank as a co-trustee. According to a trust officer at SunTrust, William sought to keep his trust's assets invested in tax-free assets to maximize tax-free income. Although the trust officer discussed with William the idea of diversifying the trust portfolio to include stock, William declined to do so. William died in 2000 and at his death his trust was worth approximately \$732,000. In contrast, his sisters' trusts which had invested almost exclusively in stocks had more than trebled in value.

Upon learning that their father's trust had appreciated only slightly, William's three children who were the remainder beneficiaries of his trust filed suit against SunTrust. They asserted that the bank had breached its fiduciary duty by failing to balance the interests of their father as income beneficiary with their interests as remainder beneficiaries. They alleged that SunTrust, by investing their father's trust primarily in

²¹ (*Merritt v. SunTrust Bank*, 2005)

²² The original co-trustees were SunTrust Bank and the father of the remainder beneficiaries. At the time of the lawsuit, Mr. Merritt had died, but SunTrust compelled the addition of Mr. Merritt's estate as an involuntary party defendant. See (*Morrison*, 2006).

non-growth assets, had failed to follow the “prudent person standard” of investing. The trial court found that SunTrust 1) did not breach any duty imposed under the trust; 2) did not violate the prudent investor rule; and 3) that the remainder beneficiaries’ interests were secondary to those of the income beneficiary. Thus, the trial court ruled in favor of SunTrust but found that an issue of fact existed as to whether SunTrust Bank, as trustee, “protected and preserved the assets of the trust because, although the actual dollar value of the trust increased, the ‘real value’ did not because growth did not keep pace with inflation.”²³

On appeal, SunTrust argued that the trial court erred in creating a duty flowing from the bank as trustee to the remainder beneficiaries to have the trust’s assets increase in value at a rate that met or exceeded inflation. SunTrust further argued that the trust’s failure to keep pace with inflation did not constitute a breach of fiduciary duty on its part. The appellate court agreed, stating that SunTrust invested the trust’s assets in a manner consistent with the trust’s settlor intent, which was to provide income to William, as the lifetime beneficiary.²⁴

A central issue in *Merritt v SunTrust* was what asset allocation to stocks in William’s trust portfolio would have been prudent and would have fairly balanced the interests of William and the remainder beneficiaries. This issue was confounded by the unusually high returns experienced in William’s sisters portfolios which were essentially 100% invested in stocks. SunTrust would not have known at the time of the trust’s funding what the future returns to stocks would be, and therefore a purely ex post comparison between the historical returns of two portfolios is not an appropriate way to assessing the prudence of the trustee’s decisions.

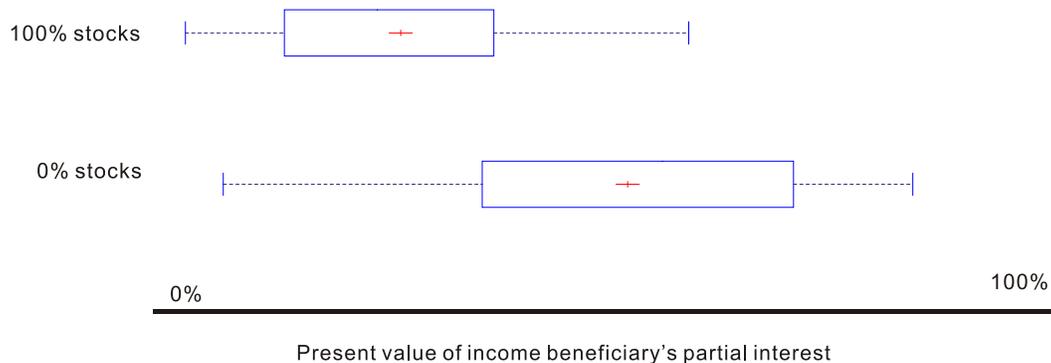
The Monte Carlo simulation approach to valuing partial interest in trusts we have outlined provides useful information to trustees and ultimately to courts in assessing a trustee’s actions because it allows us to determine the impact of the challenged conduct on the beneficiaries’ interests free of any hindsight bias. In the case of *Merritt v SunTrust* we can determine the expected present value of the trust likely to be paid out to William given SunTrust had acquiesced to the wishes of the income beneficiary to restrict the portfolio to tax-free bonds and the expected present value likely to be paid out to the income beneficiary had SunTrust instead invested 100% of the trust in stocks as the remainder beneficiaries alleged was required for SunTrust to meet its duties of prudence and impartiality. Applying the Monte Carlo simulation framework and our base case assumptions to *Merritt v. SunTrust*, the expected present value of the distributions from a portfolio invested 100% in bonds to a 74-year old male income beneficiary is \$508 per \$1,000 or 51% of the current trust value. We interpret this result as saying that SunTrust’s decision to invest the William trust 100% in bonds had the effect of dividing the trust value equally between the income beneficiary and the remainder beneficiaries as

²³ (*Merritt v. SunTrust Bank*, 2005)

²⁴ *Id.*

a group. Had SunTrust instead invested the trust 100% in stocks, the expected present value of the distributions to the income beneficiary would have been \$215 per \$1,000 or 21% of the current trust value (see Figure 5). Whether SunTrust violated its duties to the remainder beneficiaries can thus be framed in terms of whether they were entitled to 49% of the trust or 79% of the trust. Of course, the answer depends on a number of factors including the settlor's wishes but being able to quantify the entitlements claimed by the beneficiaries should assist trustees and the courts. For example, in this case the trial court asserted that the remainder beneficiary's interest is secondary to the income beneficiary, for whom the trust was designed to provide support, suggesting that a 79% distribution would be excessive.

FIGURE 5: Distributions of Present Value of Partial Interests to Remainder Beneficiaries for SunTrust Bank v. Merritt



These results demonstrate that the effect of this particular portfolio decision had asymmetrical effects on the income and remainder beneficiaries. Whether this constitutes a breach of fiduciary duty related to impartiality or prudence is of course for the courts to decide, but we propose that the MCS method offers a much more precise tool for assessing the effects of decisions and gives courts a way to quantify the impact of a trustee's actions on each beneficiary.

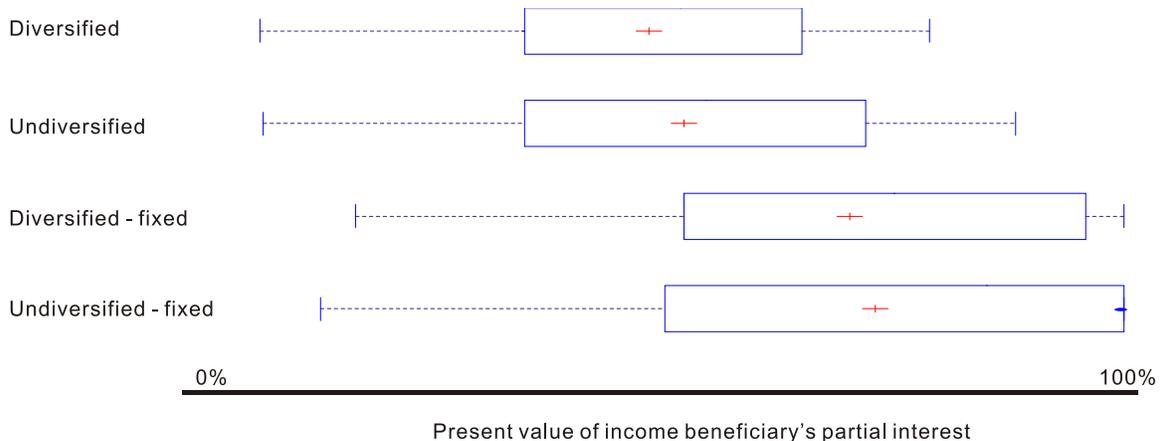
B. The Monte Carlo Simulation Has Broad Applicability in Trust Management

Our discussion of Monte Carlo simulations has focused on whether the allocation of a trust's value to income and remainder beneficiaries meets a duty of impartiality but our suggested approach has much broader application in trust management.

Poorly diversified trust portfolios expose beneficiaries to unnecessary investment risk. The Monte Carlo simulation method can help quantify the impact of any alleged lack of diversification on the trust as a whole or any differential impact on the income beneficiary versus the remainder beneficiaries. We illustrate our approach's ability to estimate the impact of poorly diversified portfolios by holding constant other capital market assumptions but assuming the stock portion of the trust portfolio in our examples has a standard deviation of 40% instead of 20%.

Figure 6 reports the present value of distributions to a 65 year old male income beneficiary assuming the trust portfolio is 50% invested in a well diversified and alternatively in a poorly diversified stock portfolio both for distributions of income only and for distributions fixed at the expected portfolio return applied to the initial trust value. As we can see, the income beneficiary's expected present value in the trust is not much impacted by the level of diversification within the stock component but the range of his or her share of the trust's value varies considerably more if the stock portfolio is poorly diversified than if the stock portfolio is well diversified. We can also see that the income beneficiary's partial interest share in the trust is much less impacted by the level of diversification in our example if a fixed dollar amount is distributed rather than if the portfolio income is distributed.

FIGURE 6: Impact of Portfolio Diversification on Present Value of Partial Interests to 65-year Old Income Beneficiary for Fixed Percentage and Fixed Dollar-Value Distributions.



We can also investigate the impact of varying asset allocations, levels of diversification and distribution rates on the income and remainder beneficiaries in absolute and risk-adjusted terms in addition to the share of a trust effectively devoted to the income and remainder beneficiaries. Table 2 illustrates the disproportionate impact of poor diversification on remainder beneficiaries. The remainder beneficiaries' residual interest is similar to a leveraged position in the trust's portfolio. If a trust's portfolio is poorly diversified, and therefore contains significantly uncompensated risk, that risk will typically be ultimately borne by the remainder beneficiaries.

TABLE 2: Present Value of Future Payments Per \$1,000 of Trust Value

Allocation to Stock: 50%

	<u>Well Diversified Stocks</u>		<u>Poorly Diversified Stocks</u>	
<i>Income Distributed</i>				
	Income Beneficiary	Remainder Beneficiary	Income Beneficiary	Remainder Beneficiary
Expected Value	\$507.35	\$492.82	\$507.64	\$493.28
Standard Deviation	\$237.97	\$280.57	\$354.13	\$491.64
Ratio	1.81	1.76	1.43	1.00
<i>Fixed-Dollar Distributed</i>				
	Income Beneficiary	Remainder Beneficiary	Income Beneficiary	Remainder Beneficiary
Expected Value	\$683.66	\$316.32	\$639.30	\$360.79
Standard Deviation	\$203.30	\$326.41	\$198.25	\$644.30
Ratio	3.36	0.97	3.22	0.56

C. Advantages of MCS Approach

The MCS method is similar to the tax valuation method in that each uses mortality tables and reasonable assumptions about portfolio growth to calculate the value of a beneficiary's partial interest. But the tax valuation method cannot factor in assumptions about portfolio composition, discretionary sale of the trust assets, or whether distributions to the income beneficiary is an inflation adjusted dollar amount, constant percentage of the trust or varying with the trustees' discretion. While the tax valuation method is able to use mortality tables, the most important considerations in trust management are related to the decisions made by trustees and their relative impact on each of the partial interest holders.

The power of the MCS method is that it can provide guidance on just these issues. Not only is it possible to use MCS to value partial interests with a variety of yearly distribution amounts or rates, but it can be easily extended to model monthly (or even weekly) distributions, onetime or repeated sale of the trust assets, and portfolio concentration in particular assets – issues that arise in real-life trust disputes. The results presented above with various portfolio compositions support the intuitive notion that altering the trust portfolio's underlying assets has a significant effect on both the income and the remainder beneficiary and that such a decision affects not only the expected value of each partial interest, but the risk borne by each beneficiary.

Since Monte Carlo simulations project out future payments over time they can be designed to incorporate one-time discretionary sale of assets by the trustee, increased account balances due to a deposit into the trust, or many other kinds of case details which may alter the underlying valuations. For example, if we assume that in the fifth year of our base case scenario, the income beneficiary was allowed a one-time withdrawal of \$200 in addition to the normal yearly withdrawal, the average present value of total withdrawals by the income beneficiary is unchanged, but the remainder beneficiary's average present value drops from \$420 to \$287. The effect on the distribution of these returns is very significant, as the potential for large values for

either beneficiary is significantly reduced.

Similarly, we could change—at any period of time in the simulation—the portfolio’s volatility, reflecting a rebalancing by the trustee into or away from particular asset concentrations (or reflecting a change in the dividend rate for a particularly relevant stock). Further analysis of the effects of these kinds of trustee decisions within the Monte Carlo simulation framework is both possible and informative.

While the duties of impartiality, prudence, and care involve much more than simply balancing the expected monetary value of distributions to the various partial interest holders in a trust, the MCS approach can show how the trustee’s investment decisions affect both the income and remainder beneficiary, often disproportionately. Most importantly, MCS methods show not only the expected values but the entire distribution of likely payouts to each beneficiary, and can therefore be used to assess the underlying risk being introduced or mitigated by portfolio modifications, sales of the trust assets, increases or decreases in withdrawals, etc.

The effect of a trustee’s failure to diversify or otherwise balance the interests of each party can be shown and quantified using the MCS framework. If a court finds that a trustee has breached his duty to diversify the portfolio, MCS can be used to resolve the various claims which may arise in litigation against the trustee. MCS offers the ability to calculate the fair proportion of a trust portfolio likely to be paid to each beneficiary, either in projections of future cash flows from a current investment or looking at effects of previous decisions in portfolio management. Thus, MCS can quantify the relationship between alleged breaches of the duty of impartiality and the impact of those alleged breaches on beneficiaries.

Such an approach is highly congruent with current interpretations of trust law, though novel in important ways. In his discussion of the role of market data in calculating damages in trust law, Robert Sitkoff suggests “market data might be useful for ascertaining *both* breach *and* damages in surcharge actions for imprudence”; in regard to the former, “this idea in practice should involve assessing the tightness of fit between the portfolio’s design and the risk-tolerance of the trust’s beneficiaries,” and “on the question of remedy...this means the use of historical data to model how a proper portfolio would have performed and then a comparison of this hypothetical against the actual portfolio’s performance.”²⁵ Our proposed valuation approach directly assesses the riskiness of the portfolio design for both income and remainder beneficiaries, and is therefore a direct measure of the ‘tightness of fit’ between portfolio design and suitability issues of beneficiaries (as well as the desires of the settlor). In regards to damages, our approach is calibrated to market data, but is *not* dependent on the returns observed after the trustees’ action, but rather on the market information as known to the trustee as he or she made the investment decisions (and therefore does not hold a trustee responsible for market movements he or she could not have foreseen). We therefore propose that MCS-based valuation is ideally suited for fairly and objectively assessing trustees’ decisions.

VI. Conclusions

The two most common valuation methods used by courts to value partial interests in trusts are the tax valuation method and a fixed percentage method. Both have significant limitations in that they cannot incorporate factors which are common points of contention in trust

²⁵ (Sitkoff, 2003)

management and therefore do not provide useful information for assessing trustee decisions. In this article, we have introduced the MCS methodology and discussed how it differs from the tax and fixed-percentage methods. We also explained how MCS might be applied to assist both trustees and courts in valuing partial interests in trusts and assessing whether a trustee met the duty of impartiality or prudence. By grounding the assessment of prudence in a quantitative application taken from modern portfolio theory, trustees will now have a more precise method to guide them in achieving the delicate balancing act that modern trust law requires. Courts, in turn, will have a better benchmark by which to judge whether a trustee has breached their fiduciary duties..

The results presented in this paper highlight the complexity of partial interest valuations and their sensitivity to a variety of factors. This variability has potential implications for statutory policy regarding partial interests in trusts, especially in states that mandate or suggest fixed percentage allocations to beneficiaries. Such simplistic approaches can significantly over- or under-estimate the economic value of a partial interest. Given the ease with which the MCS method can be implemented and adjusted, both legislators and courts reviewing trust management issues should be aware of and consider, as economists have for some time, this powerful approach.

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