



Modern Portfolio Theory –with a Twist

The New Efficient Frontier

Brian Dunn

Aquillian Investments, Inc.

August 2006

With gratitude to the following individuals for their valuable comments:

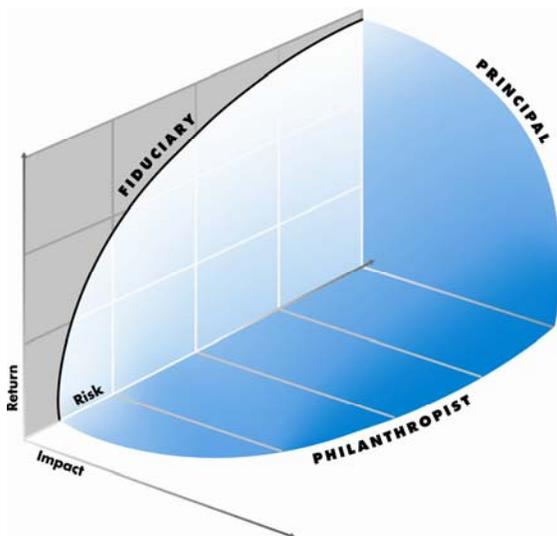
Bill Tarr
Divesh Makan
Robert Lang
Paul Frankl
Raul Pomares
Suzanne Bellet
Ralph Dryborough
Jeff Wycoff
Kurt Rauzi



EXECUTIVE SUMMARY

The relationship between **Risk** and **Return** forms the basis of investment theory. This essay introduces a third dimension, **Impact** -- the benefits that one can receive from investing in the social good. The goal of the paper is to create a framework that can assess investment opportunities that are intended to transform the world for the better, side by side with traditional investment opportunities that exist “only” to make money.

We draw heavily on Modern Portfolio Theory (MPT), which explores the effect of correlation of assets within a portfolio. MPT posits that an “Efficient Frontier” exists, which is the set of portfolios that most optimally trade off the inherent tension between Risk and Return. This essay extends the insights of MPT’s Risk-Return model to a proposed third dimension: Impact. Since humans are not motivated by financial considerations alone, we find that the “new efficient frontier” provides a useful mechanism for evaluating portfolios that are truly optimal for real-life investors.



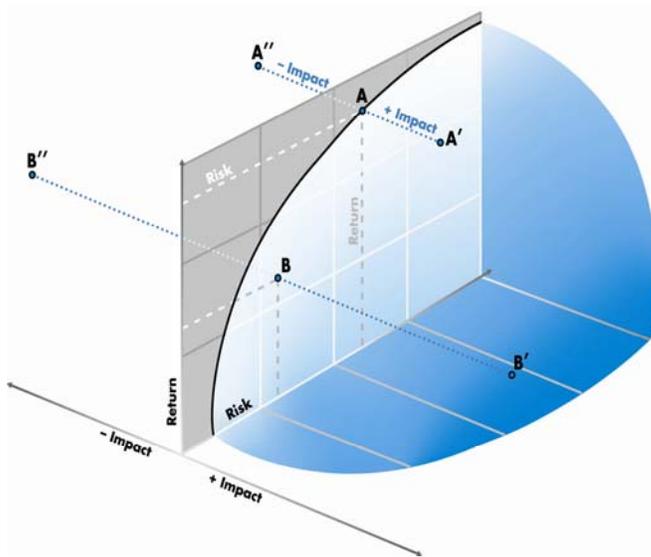
There are three distinct audiences: Fiduciaries, Philanthropists, and Principals. While Fiduciaries and Philanthropists are relatively constrained, Principals have a great deal of latitude in deciding how to manage the trade-offs between Risk, Return, and Impact.



The Efficient Frontier marks the “sine qua non” for portfolio managers – the very best set of portfolios that they can create for their clients. The specific portfolio that is optimal for a given client depends on that client’s attitude towards risk and return, which can be visualized through “indifference curves.” When considering the New Efficient Frontier, indifference curves are once again useful in visualizing one’s position – but now, they have three dimensions.

In mathematical terms, we are suggesting that optimization of one’s portfolio is not merely a function of risk and return. Optimization is a function of risk and return, **plus** a function of impact. Assuming the risk and return characteristics of two portfolios are equivalent, the portfolio that is better aligned with its owner’s desire for impact is a better portfolio. We conclude by hypothesizing an investment “target zone,” consisting of investments that maximize return and minimize risk, while also considering impact.

No matter what an investors’ priorities, the framework allows individual investment opportunities that transform the world for the better to be considered alongside traditional opportunities that exist “only” to make money. How much an investor decides to choose one set versus the other depends on the investor’s inherent investment assumptions. A portfolio that maximizes Return and Impact, while minimizing Risk, can wisely be considered the best of all.





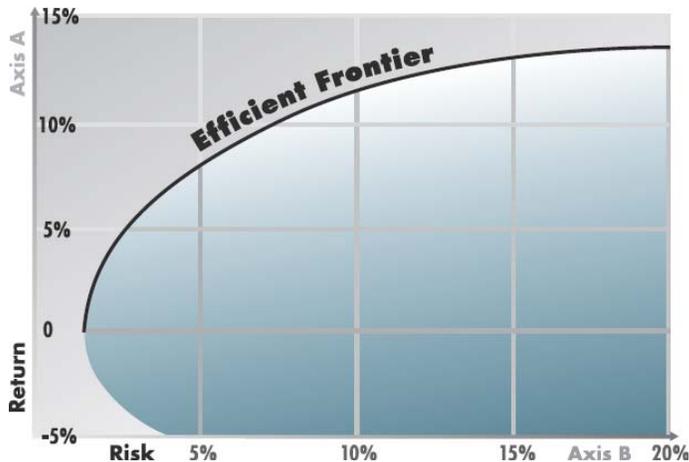
Modern Portfolio Theory – with a Twist

Little wonder that Economics is often referred to as the dismal science. At its heart lies the “Homo Economicus,” a hyper-efficient manifestation of humankind that is assumed to seek the highest return with the least possible risk. There is no room for emotion within Homo Economicus; his “rationality” precludes such emotions as altruism, stewardship, patriotism, or concern about future generations. Economists use this flawed model in order to make analysis simpler, even while admitting that the methodology can lead to inaccurate conclusions. This essay extrapolates from one of the most valuable insights of economic analysis, and adds the human dimension to create a more complete picture.

1. THE NEW EFFICIENT FRONTIER

Modern Portfolio Theory (MPT), first introduced by Harry Markowitz in 1952, has proven to be enormously influential in asset allocation theory. Whereas previous analysis had concentrated on the risk and return of individual securities, MPT examined the risk and return of the portfolio as a whole, taking into account the correlation between the individual securities. Out of the entire universe of possible portfolios, certain portfolios will optimize the inherent tension between risk and return. These comprise the “efficient frontier”.

Figure 1: Efficient Frontier

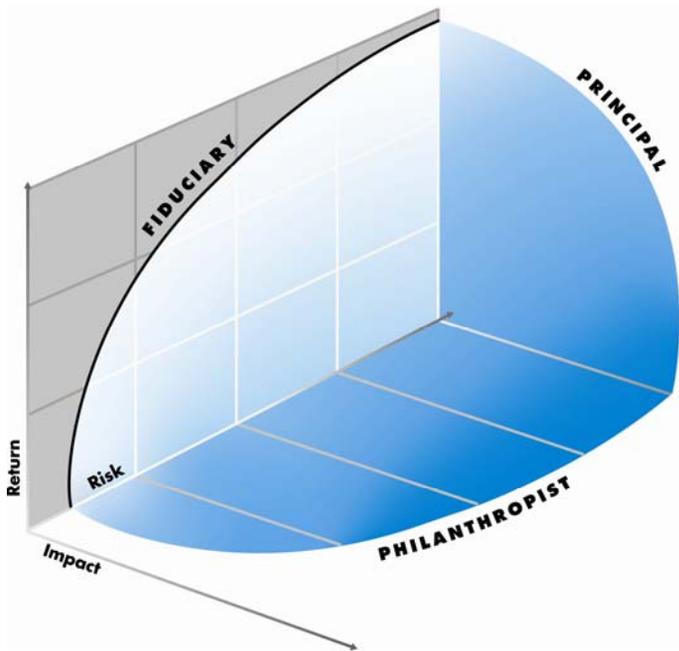




Although it does not take the full range of human behavior into account, the theory of MPT is statistically complex, and its application has often empirically proven to be financially rewarding. Therefore, instead of abandoning the heart of the theory, we have simply added another perspective in order to more fully account for human behavior.

In an attempt to do this, we have introduced an additional dimension, dubbed “Impact,” to the MPT relationship between risk and return. This third dimension attempts to model more humanity into the Homo Economicus archetype. Impact represents the benefits that one can receive from making investments that are congruent with one’s inner beliefs: be it stewardship for future generations, doing good works, or using one’s time on Earth to its full potential. Since it is by nature so idiosyncratic, “impact” does not have the clean units of measurement that we find in the “risk” or “return” categories: there is no clean corollary to “standard deviation” for risk, or “internal rate of return” for return. Instead, each individual defines “impact” in his or her own terms.

Figure 2: New Efficient Frontier





What does the New Efficient Frontier look like? Imagine an apple in your hand. Cut the apple in half, and then into quarters, and then into eighths. Take one of the eighths, and rotate it so a piece of the core is pointing toward you. Now think about the skin of that apple: the dome that makes up the tiny top layer. This is the New Efficient Frontier. It's the combination of the opportunities that are available to you that create the most effective portfolios, given your preferences for risk, return, and impact.

In mathematical terms, we are suggesting that optimization of one's portfolio is not merely a function of risk and return. Optimization is a function of risk and return, **plus** a function of impact. Assuming the risk and return characteristics of two portfolios are equivalent, the portfolio that is better aligned with its owner's desire for impact is a better portfolio.

This may seem abstract until we realize that a similar set of considerations goes into almost every decision we make. We are constantly managing the trade-offs between risk, return, and impact: for example, when we consider a new job, we don't think only about the salary and the stability, but also whether we will enjoy the work.

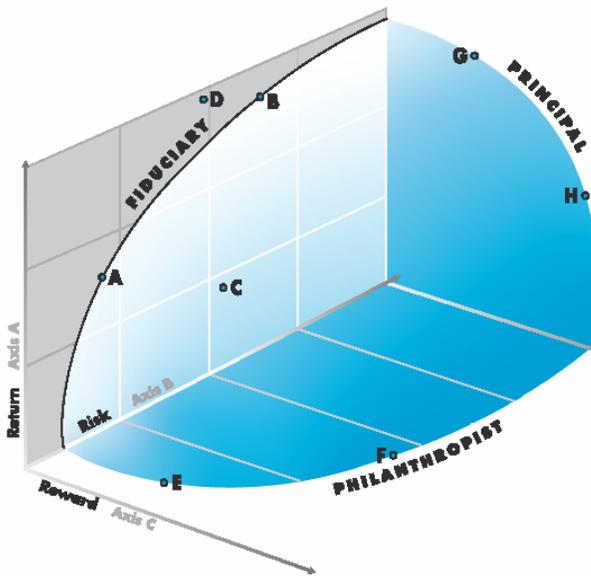
Perhaps the greatest disservice created by our modern financial system is that most participants are forced to reduce a complex reality to variables that are easily measured. Similarly, the non-financial variables that are part and parcel of a discussion of impact are relegated to a very specific investor audience. In fact, the modern financial system divides its participants into three very distinct groups, as the next section will discuss.



2. FIDUCIARIES, PHILANTHROPISTS, AND PRINCIPALS

The New Efficient Frontier applies to three distinct groups: Fiduciaries, Philanthropists, and Principals. While Fiduciaries and Philanthropists are mostly confined to evaluating opportunities on two axes, Principals can evaluate all three axes at once.

Figure 3: The Actors in the New Efficient Frontier



Fiduciaries. Most money in the United States is not managed by the families that own it. They turn that responsibility over to Fiduciaries, who are then obliged to manage it wisely on behalf of and in accordance with the wishes of the owners. Needless to say, few Fiduciaries include Impact as one of the dimensions that they measure, because they are not measured on it themselves.

Therefore, Fiduciaries currently only seek the portfolios on Figure 3 represented by points A and B. At these points, Impact = 0, because Impact is not a factor in the equation that determines an investment decision. Point A offers lower risk and lower return than Point B. But it is no worse of an investment: it



appeals to an investor who cannot accept much risk. However, Point C is a worse investment than either A or B: the return is too low considering how much risk it involves. Point D, on the other hand, is probably unattainable, at least over the long term: arbitrage theory dictates its ability to maintain such a high return relative to its risk will dissipate over time.

Philanthropists. On the other hand, philanthropists are forced by the tax codes to give their money away, and not expect a financial return. While Program Related Investments (PRIs) represent an avenue for philanthropists to put money to work in a financially self-sustaining manner, few take advantage of this exception to the IRS regulations. Thus, where Fiduciaries measure success in terms of high return relative to low risk, Philanthropists measure success in terms of high impact relative to low risk.

Therefore, Points E and F are appropriate for Philanthropists. Point E represents a good deed that has relatively little risk but also creates relatively little impact: giving money to various local arts associations, for example. Point F represents a riskier mission, but one that creates more impact, such as giving money to fund disaster relief operations. Again, both of these points are on the New Efficient Frontier, and they are both appropriate for Philanthropists to pursue. The type of philanthropy that is pursued depends on one's own preferences regarding risk and impact.

Principals. Principals manage their own money, and unlike a Fiduciary or a Philanthropist, can do what they like with it. Principals can evaluate all three axes at once. They can sit any place along the frontier that they choose to. Points G and H are both appropriate for Principals, depending on their preferences for risk, return, and Impact. If nothing else, this model points out the huge range of opportunity available to those who manage their own money, as they are freed from the fiduciary responsibilities that are experienced by those who manage other people's money.



3. INDIFFERENCE CURVES AND INDIVIDUAL PREFERENCES

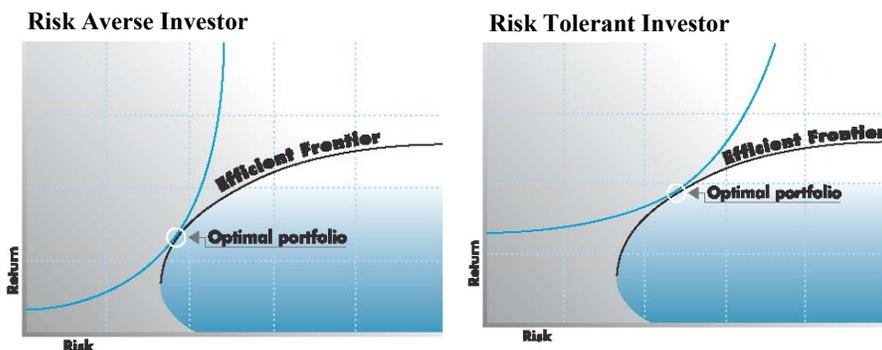
If there are infinite portfolios that are appropriate for Fiduciaries, and additional infinities of portfolios that are right for Philanthropists and Principals, how can one determine which specific portfolio to create? Here again, we turn to well-developed economic wisdom concerning “indifference curves,” and extend it to an additional dimension.

An indifference curve is a graph showing combinations of goods for which a consumer is indifferent, meaning that one has no preference for one combination versus another. In simplistic terms, if a consumer was equally satisfied with (one apple and four bananas) or (two apples and two bananas), then these combinations would all lie on the same indifference curve.

In Modern Portfolio Theory, instead of measuring apples and bananas, the same device is used to measure risk and return. Homo Economicus is assumed to prefer more return to less return, and less risk to more risk. Each consumer’s indifference curve has a slightly distinct slope. Some will be less willing to give up apples for bananas, while others prefer bananas to apples; similarly, some investors will be willing to accept more risk, and others less risk. Economic theory tells us that there are as many indifference curves as there are individuals.

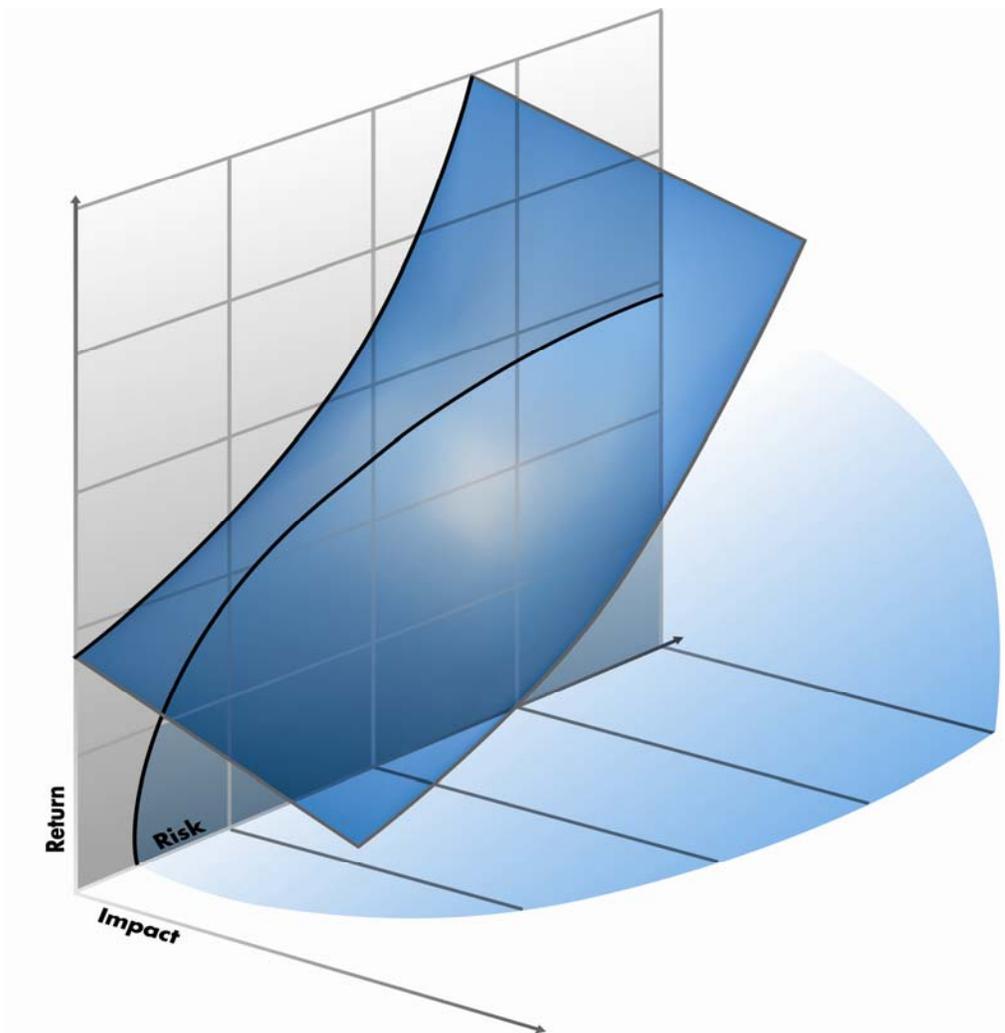
In economic jargon, each individual finds the optimal portfolio at the point where the efficient frontier meets their highest indifference curve. In other words, the optimal portfolio for each particular investor is at the point of tangency between the highest utility indifference curve and the efficient frontier.

Figure 4: Risk Averse and Risk Tolerant Investors



Now, applying the same concepts to the New Efficient Frontier, imagine an indifference curve that takes into account all three dimensions we have discussed: risk, return, and impact. Remember that for this discussion, we are using Fiduciaries to represent “Impact is not considered,” and Philanthropists to represent “Return is not considered.” Each of those categories contain within them an infinite number of indifference curves, representing different sets of preferences regarding Risk and Return (in the case of the Fiduciary) and Risk and Impact (in the case of the Philanthropist).

Figure 5: Sample Indifference Curve for the New Efficient Frontier





When we add all three dimensions to the picture, many more points form a tangent between the New Efficient Frontier and the 3-Dimensional indifference curve. No longer are we relegated to the status of Homo economicus, blindly pursuing the solution that is only optimal in terms of risk and return. At the same time, we do not pretend that business logic is unimportant, since business logic is likely to create the most cost-effective and scalable solutions. Instead, we have a cohesive framework to help portfolio managers develop the solutions that make the best sense for each of their clients, and a tool that will help principals organize and articulate their investment preferences. The additional dimension is a liberating breakthrough in the interface between investment theory and real-world concerns, and offers a new frontier for those who work to put investment theory into practice.

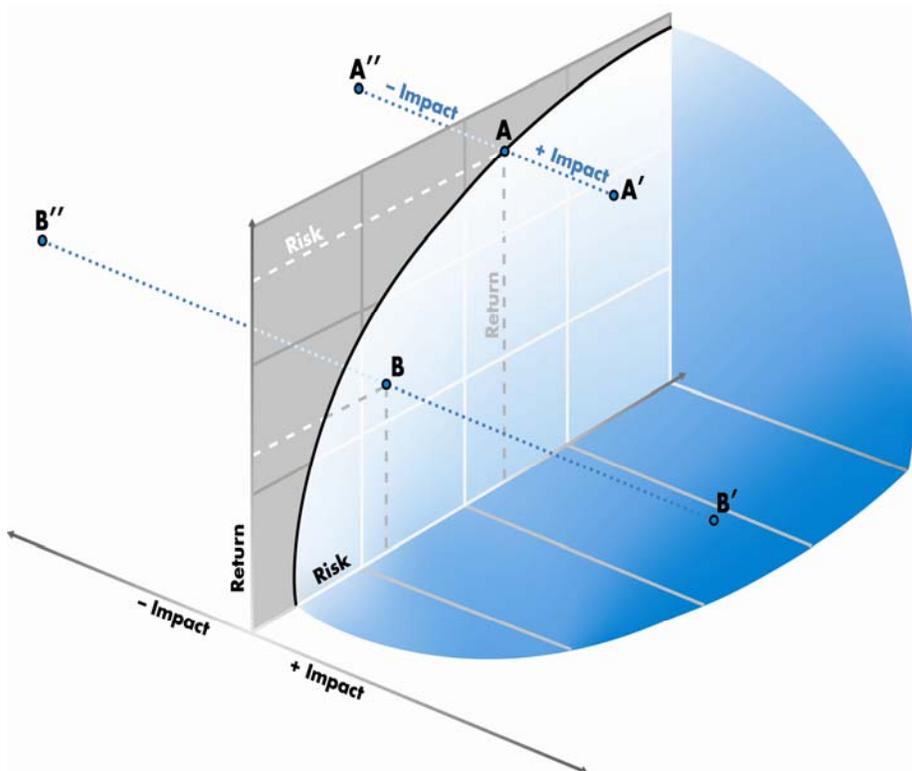


4. CONCLUSION

Efficient markets are ruthless creatures. For-profit ventures that are unprofitable should simply not be funded, even if they provide significant impact: they should either be funded as non-profits, or should be retired to make room for the next idea. Thus business logic will always be crucial in determining the best set of for-profit investments: stated briefly, “no margin, no mission.”

On the other hand, if two investments offer identical risk-return profiles, it makes more sense to invest in the one that has more impact. Impact, as the third mathematical term, can add value to the equation.

Figure 6: The Value of Impact

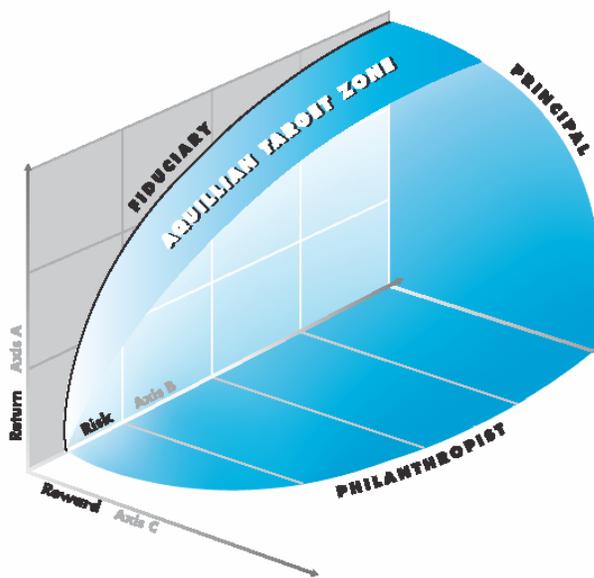




This conclusion can be taken one step further. If there can be no lasting impact without financial return, at least none that will withstand the test of time, then well-designed private enterprises are the appropriate vehicle to produce cost-effective, sustainable, and scalable solutions to social challenges -- in other words, the greatest long-term Impact. The fact that private enterprise simultaneously produces financial return for investors only increases its odds for longevity. For long term societal benefits to be sustained and scaled effectively, they must be synchronized with short term financial priorities.

If one agrees with this argument, then a Target Zone emerges on the New Efficient Frontier. Portfolios that maximize return while minimizing risk are most likely to survive in the marketplace. Those that include consideration of impact are best suited to accomplish an individual's non-financial goals.

Figure 7: Target Zone



No matter what an investors' priorities, the framework allows individual investment opportunities that offer the potential to transform the world for the better to be considered alongside traditional opportunities that exist "only" to make money. How much an investor decides to choose one set versus the other depends on the investor's inherent assumptions. A portfolio that maximizes Return and Impact, while minimizing Risk, can wisely be considered the best of all.

