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Investment Evaluation Framework for Socially Responsible Investing and Islamic Finance

Sajjad H. Shah

Most modern investment decisions involve maximizing return for the level of risk an investor is willing to take. This is because such decisions primarily involve the consideration of return and risk, which are germane to the profitability of the business. There is the general assumption that investors are averse to risk but seek to maximize profits.[1] Finding equilibrium between return and risk has been a major challenge for finance experts.[2] The efficient portfolio theory not only provides the theoretical foundation for modern portfolio management but also provides a concrete and precise relationship between financial risk and return, which enables one to determine the minimum expected return of an investment asset commensurate with the risk inherent in it.

Though it seems too general to model the risk/reward aspects of an investment asset, all the assets in investment must be viewed solely within the two-dimensional world of financial risk and return. The newly emerging financial fields of Socially Responsible Investing (SRI) and Islamic Finance (IF) are concerned with more than the financial risk and return aspects of an asset. An equally, if not more, important aspect of an investment is the degree of social benefit/religious compliance, which an asset must provide to merit inclusion in a portfolio. This paper first looks at efficient portfolio theory as it is used in conventional asset management and then assesses its applicability to SRI and IF.

Efficient Portfolio Theory

Efficient Frontier

Markowitz's efficient portfolio theory is based on *expected return on investment* (function of securities' returns constituting the portfolio) as well as the *expected portfolio risk* (variability in the returns of the portfolio that is measured as a standard deviation of the portfolio's returns over a period of time). The expected portfolio risk is also a function of the risks of underlying

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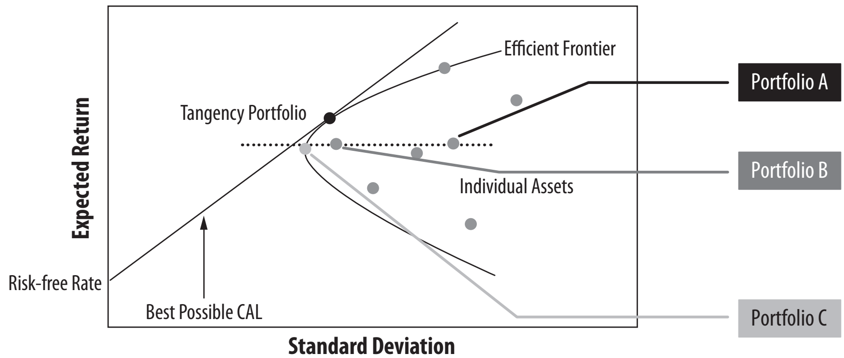
Figure 1. Efficient Frontier[4]



securities, although this is not a linear function due to the risk correlation among different securities resulting in diversification.[3]

Given the different combinations of securities in the market, different investment portfolios can provide a certain expected portfolio return. For the same level of expected return, multiple portfolios might be formed that differ in only the measures of risk. Two such portfolios are shown below as portfolio A and portfolio B in Figure 1. Efficient Frontier. Both portfolios offer almost the same level of return but differ in the risk. Assuming the investors are rational and prefer lower risk for return, portfolio B is preferred over portfolio A, as it offers the same return with lower risk.

If all the possible portfolios are plotted, there will be one unique portfolio for each level of return, which offers the least amount of risk. In efficient portfolio theory, such a portfolio is termed an efficient portfolio. Plotting all such efficient portfolios in the return and risk space provides a hyperbola as shown below by the "Efficient Frontier" curve of the Markowitz efficient frontier in the diagram below.

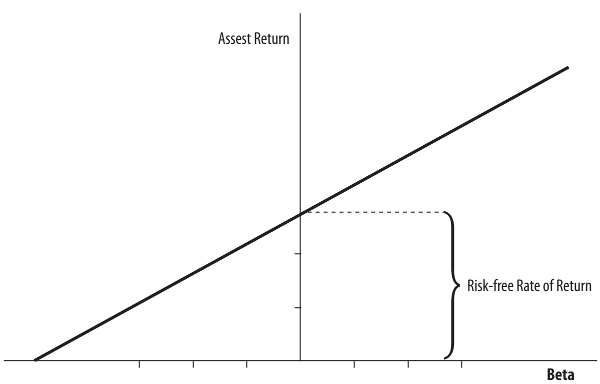
Capital Market/Allocation Line (CML/CAL) and Capital Asset Pricing Model (CAPM)

Using the efficient frontier concepts, the Capital Asset Pricing Model (CAPM) was developed and is extensively used in finance to determine a theoretically required rate of return for an asset. There are numerous applications of CAPM. Using CAPM, an investment asset's return rates can be calculated, including discounting the cash flows of the asset and thus assessing its suitability for inclusion in a portfolio.[5]

CAPM uses the concept of Capital Market/Allocation Line (CML/CAL) by forming a portfolio with two asset classes: a risk-less asset (cash or fixed income bond asset) and a risky portfolio from the efficient frontier. The risky portfolio is at the intersection of the efficient frontier and the tangent drawn from the risk-free rate to Markowitz's frontier, shown as "Tangency Portfolio" in Figure 1. Efficient Frontier. Almost infinite combinations of the risky portfolio and risk-less assets can be derived by varying the proportions of each asset class. The risk-free asset proportion can even go beyond 0 (negative) by assuming that such an asset (cash or fixed income bond) can be borrowed to purchase the risky assets, such that the overall portfolio has a proportion of risky assets that exceeds 100 percent. The tangency line joining the risk-free asset to tangent on the efficient frontier is known as CML/CAL. The tangency portfolio is known as the market portfolio or super-efficient portfolio as it provides the highest Sharpe ratio (a measure of the amount of return above the risk-free rate that a portfolio provides for each unit of risk it carries). Any combination of the portfolio and the risk-free asset will produce a return above the efficient frontier, thus providing a larger return for a given amount of risk than a portfolio of risky assets alone on the frontier.

Based on this understanding, CAPM uses the concept of the market portfolio and the asset's risk relative to the market portfolio risk, as measured beta (β). The plot of the return of each security against β (asset risk dependent on the market or systematic risk) gives the familiar SML diagram an alternate representation as in Figure 2. Security Market Line.

Figure 2. Security Market Line[6]



Using this line to calculate the expected return of a certain asset is a simple exercise of the application of line equation. The familiar CAPM formula from this line is:

$$\frac{E(R_i) - R_f}{\beta_i} = E(R_m) - R_f$$

Where

- § $E(R_i)$ is the expected excess return on the asset;
- § R_f is the risk-free rate of interest such as interest arising from government bonds;
- § β_i (the beta coefficient) is the sensitivity of the expected excess asset returns to the expected excess market returns;
- § $E(R_m)$ is the expected excess return of the market, sometimes known as the market premium or risk premium (the difference between the expected market rate of return and the risk-free rate of return).

A more common form of the CAPM formula provides a way of calculating the expected/required return of an asset:

$$E(R_i) = R_f + \beta_i (E(R_m) - R_f)$$

Investment Evaluation Decisions Within IF and SRI Arenas

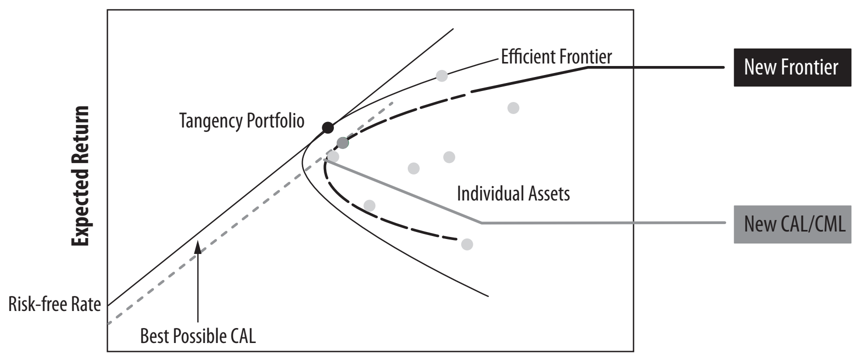
Investment decisions for SRI and specifically for IF need additional parameters beyond the traditional concepts of risk and return.[7] The compliance with *shari'a* constraints is as important, if not more so, during the investment selection and evaluation process as the concepts of risk and return. There is similar variable for SRI to capture the social benefit of an investment asset beyond risk and return.[8] Currently, different investors might use different factors, some qualitative and some quantitative, to capture this additional attribute for these investment assets; however, there is no industry-wide common model/definition to accommodate this. Despite this, the additional factors of SRI or IF are still taken into consideration while selecting an asset for a portfolio. Various players see these factors as an integral part of their internal calculations in assessing the suitability of an asset even if they do not externally communicate these factors.[9] The remainder of this chapter will look at one possible way to incorporate factors beyond financial risk and return within SRI and IF.

The Impact of Compliance Constraints on Efficient Frontier

SRI and IF introduce another concern regarding investments: the benefit of an investment to the society. Because of this benefit, SRI and IF limit the number of possible assets and portfolios, as illustrated in the diagram for constructing Markowitz's efficient frontier. It is possible that some of these portfolios/assets lie on the efficient frontier and with these investment vehicles unavailable to investors, the frontier is pushed inward. For instance, some of the less optimal portfolios from the original universe are optimal under the new constrained investment universe, which is a subset of the original set.

The parabolic shape of the efficient frontier is the result of different assets in various portfolios, and due to the subset of permissible investments in IF, new diagram for the efficient frontier will most likely be a parabola but with reduced width. One such depiction is drawn below in Figure 3. Efficient Frontier Under Constraints of IF or SRI, with respect to the original efficient frontier. The broken curve line is represented in deep black color. This logic is based on a qualitative argument as opposed to strict mathematical rationale, which might be investigated in future work.

Figure 3. Efficient Frontier Under Constraints of IF or SRI



Based on the new frontier, the market portfolio has also shifted to the right and downward, as indicated by the point of tangency between the new frontier and the line passing through the origin of the graph. The case of a line passing through the origin, as opposed to risk-free rate, is more applicable to Islamic finance and not related to SRI. In the case of IF, as there is no place for fixed interest or a risk-free rate, a portfolio consisting of risky and risk-less assets within the IF world consists of pure cash, although after adjusting for inflation it would have a negative rate of return, and risky investment of market portfolio. In this case, the optimal overall portfolio consists of different proportions of these two asset classes (some holdings of cash and some assets comprising the market portfolio) and CML/CAL is the line from the origin to the market portfolio on efficient frontier. In the case of SRI, the line will extend from the risk-free rate to the new market portfolio. Due to this difference between cash assets and risk-free assets within IF and SRI, all the portfolios on CML/CAL with risks lower than that of the market portfolio have lower expected returns for IF portfolios as compared to SRI. This is the result of no return for a cash asset in IF versus the risk-free asset of SRI.

In the case of Islamic finance, the benefits offered by a risk-free asset, such as cash, are primarily the risk reduction with no return earning opportunities; hence, the CML line is quite steep. However, there are few implications of this fact, which might not be as important in traditional Markowitz portfolio theory.[10] There is an assumption in original theory that investors can lend and borrow in an unlimited fashion, but this has limited applicability in the real world because the CML/CAL line goes well beyond market portfolio (as in the case of the market portfolio point investor who borrowed funds to purchase more than 100 percent of the risky asset). In the case of IF, this assumption of unlimited borrowing is even less accurate as there are no return opportunities for liquid assets. Therefore, there is even less possibility of portfolios further away on the upper side of the market portfolio. Even portfolios heavily concentrated in liquid assets, such as cash, will be less attractive due to the limited role of cash, and the fact of risk reduction without the upside potential of return. For IF, the more realistic portfolios on CML/CAL are the ones lying on the left of the market portfolio.

Compliance Constraints Costs

As is clear in Figure 3, both the efficient frontier and CML/CAL have shifted down and to the right for IF and SRI investment options due to the additional constraints of compliance with *shari'a* or other social objectives. This shift can be termed a financial cost of this additional constraint.[11] The extent of this cost is dependent upon the number of investments left out during the compliance stage and upside potential of those investments. The greater the number and the higher the potential of these investments, the higher the costs for compliance will be to these markets. The cost can be either in terms of smaller returns or lack of risk-reduction vehicles available to the investor. However, a significant part of the concern is the smaller return expectation, as risk can be reduced by replacing some of these unavailable securities with other compliant securities to enhance diversification for reducing risk. This is particularly true as the number of assets needed for a reasonably well-diversified portfolio is not very large—usually less than 50 such assets are sufficient due to the lack of correlation among these assets.

One model to measure or estimate such costs of investment opportunities with lower potential returns and/or limited risk-reduction opportunities involves using the historical data over sufficient time periods. As a first step, one must find the differences between the historical returns on the market portfolio (on may use proxy from market indices like the S&P 500) and on a comparable compliant index (like KLD for SRI, Dow Jones Islamic Market Titans 100 Index for IF, etc.). The average of such difference over sufficient time periods can be a good proxy for the cost of compliance. The other part is the long-term fixed income security, risk-free asset returns, as this represents lost opportunity when cash is held in compliant portfolios instead of the fixed income risk-free asset.

The forward-looking estimation of such costs based on the more traditional, fundamental factors (like inflation, term structure, etc.) can also be derived by using the regression and historical costs as described in the previous paragraph.[12] If one regresses the historical cost on the historical values of fundamental economic variables (inflation expectations, term structures, etc.), the resulting regression model could predict the future costs of these compliant investments above and behind the usual risk/return profile provided by efficient frontier and CAPM concepts. Such a model can provide a basis for calculating the expected return from an investment opportunity within SRI/IF and enables one to assess the relative attractiveness of different investments.

CAPM Model Implications

CAPM model relates the expected/required return rate with the relative riskiness of an asset to market portfolio. For IF and SRI, the additional constraint of compliance might result in a reduction in expected return or an increase in the riskiness of a portfolio. There can be two ways to incorporate this additional factor in the CAPM formula depending on whether the market portfolio and its premium are for the conventional market or if they are based on the market index specific to IF/SRI.

CAPM model using the market portfolio from unconstrained investment space
If the calculation is based on a market portfolio from the conventional unconstrained practice, where there is no constraint of adherence to one's moral or religious values, (such as the S&P 500 for the U.S. market), then the costs of additional compliance constraints can be included in the traditional CAPM formula to calculate the required rate of return from certain compliant investment as follows:

$$E(R_i) = R_f + \beta_i\,(E(R_m) - R_f) + (\text{dc} * \text{CC})$$

Where the additional terms in the CAPM equation are as follows:

§ dc is the degree of compliance, a coefficient varying from 0 to 1 with 0 for non-compliant assets, 1 for compliant and other values for partially compliant. The actual values in the range (0–1) can also vary from IF and SRI as IF might have stricter criterion for compliance with less room for partial-compliance scenarios, whereas within SRI some investment opportunity might be offered to partially achieve social/moral objectives. The 0 end of the range will cause the above equation to make the required rate of return from an asset the same as from the conventional financial world.

§ CC is the cost of the compliance, which might be pooled across asset classes. One way of estimating such costs is described above from the historical data analysis. Although the above method provides a single value of the cost across all compliant assets/portfolios, the same procedure can be applied to either asset classes (assets with similar characteristics) or even to individual assets, especially if the asset has enough history and a comparable non-compliant asset in the marketplace. In this way, CC can be thought of like β, which is also usually calculated by looking at the historical returns of the asset and then regressed over the corresponding market index.

Hence, this updated version of CAPM can be used to calculate the expected or required return from a compliant asset as long as the coefficient of compliance (dc) and cost of compliance can be determined. The coefficient of compliance is a subjective value assigned by the relevant screening mechanisms (*shari'a* board in the case of IF) of the investment processes. However, certain objective rules can be devised to calculate a value of dc for a new investment. For IF, such rules can be based on factors such as the degree of involvement in forbidden activities, speculation, hedging, etc. Some of these factors can be obtained from the financial statements of the company.

Although the CC can be based on the historical performance of investment or similar investments, the predicted CC values, like any other prediction model based on the historical data, might not reflect the true cost incurred going forward.

CAPM model using the market portfolio from IF/SRI investment universe
This second method uses the market portfolio from the IF/SRI and includes the market premium of such a portfolio in the CAPM equation.[13] So the CAPM formula remains similar to the conventional form:

$$E(R_i) = R_f + \beta_i(E(R_m) - R_f)$$

However, the market risk premium $(E(R_m) - R_f)$ is for the market portfolio specific to IF/SRI. This is the new tangency point in Figure 3, between the updated CML/CAL line and new frontier, which is shown as a green line. This formula is even further simplified for IF, in which the line passes through the origin, as there is no fixed interest rate asset (risk-less) in IF. So the updated equation for IF using this second method is further reduced to:

$$E(R_i) = \beta_i * E(R_m)$$

This shows that the return contribution to the overall portfolio (consisting of cash and risky portfolio) comes from the risky portfolio with no contribution from the cash portion of the portfolio. Furthermore, this contribution is filtered by the beta (β_i) of the risky portfolio.

Limitations of the Updated Efficient Frontier and CAPM Model for IF and SRI
The above rationale for looking at the efficient frontier as constrained by the IF and SRI is mainly based on qualitative observation and analysis as opposed to mathematical foundation. There is a need to look at the updated frontier using more rigorous and mathematical bases that may comprise a good topic for future study. Another weak assumption of the updated model might be the shape of the updated frontier, which may not form an exact parabola, though it will be close to it. A mathematical model for such a shape may present a challenge during future work. Given the fact that the Markowitz model lacks some basic investment assumptions that are based on IF principles, the updated model might not be comparable to our traditional understanding and application of the efficient frontier model.

The updated CAPM model needs the consideration of two new concepts: coefficient of compliance (dc) and cost of compliance (CC). The value for dc is quite subjective, whereas the value of CC is dependent on historical data. This data either may not be available for relatively newer investments or may not reflect the actual situation going forward. Despite these challenges, the proposed model can provide a realistic and straightforward framework for calculating the expected returns from different investment opportunities within SRI and IF.[14]

Conclusion

It is necessary to extend the concepts of efficient frontier and risk-return tradeoffs that are the tenets central to the conventional investment evaluation and selection process. The emerging fields of SRI and IF necessitate looking beyond the financial risk and return of Markowitz's paradigm to evaluate optimal investment decisions. SRI and IF incorporate additional elements, like degree of values, *shari'a* compliance and the extent of communal benefits.

Due to these additional considerations, one model proposed here is to extend the conventional model to include SRI- and IF-compliant assets. This additional benefit comes with costs in terms of reducing the expected return from the compliant asset. Combining all these concepts results in the extended version of CAPM. However, there is need for a more rigorous mathematical treatment of an extended version of CAPM, as presented above, as well as testing with the real-world data to assess the applicability of the extended concepts of compliance and cost of compliance.

Endnotes

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11. Of course, this cost has some benefits, not necessarily directly financial benefits, which this analysis has not taken into account. Such benefits might include the satisfaction of the compliance to one's religious tenets, in case of IF, or sense of achievement for some moral/societal benefits in the case of SRI.
12. Marc R. Reinganum, "A New Empirical Perspective on the CAPM," *Journal of Financial and Quantitative Analysis* 16:4 (1981): 439–462.
13. IF/SRI indices like KLD and Dow Jones Islamic Market Titans 100 Index can be proxies for such a portfolio.
14. Somewhat similar difficulties exist even in the conventional financial model where the betas and others parameters are calculated based on historical data that may or may not reflect present or future performance of the investment vehicle.