

CAN INTERNATIONAL DIVERSIFICATION REDUCE PORTFOLIOS' RISK AND COSTS THROUGH THE USAGE OF VARIATIONS OF CAPITAL ASSET PRICING MODEL? AN EMPIRICAL REVIEW

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Abstract

Bibliography suggests many ways with which risk can be predicted or/and be minimized. Initially, diversification of a portfolio was first proposed as an idea by Markowitz (1952), who described how to combine assets into efficiently diversified portfolios. He demonstrated that investors failed to account correctly for the high correlation among security returns. Diversification, he concluded “reduces risk only when assets are combined whose prices move inversely, or at different times, in relation to each other”. Modern portfolio theory constitutes the basis of this concept that is diversification reduces risk. This paper aims to analyze critically fundamental methods with which risk and returns of emerging market investments can be found and measured as well as if risk, discount rates, and transaction costs can be reduced for international diversified investments.

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1. Introduction

In every aspect of an economy, investors make continual efforts to earn the maximum returns through the buy-and-hold method of securities, assets, and bonds. Markowitz (1952) was the first, at least officially, who demonstrated and proposed the combination of assets with specific characteristics. The Markowitz approach is often called a “mean-variance model”. These concepts of efficiency were essential to the development of the Capital Asset Pricing Model (CAPM). Finally, he concluded that a diversified portfolio can reduce risk. From the early 50's until present, not only economic environment has altered, but also new security products have come up. Internationalization of local economies and stock exchanges creates new challenges as well as threats to the investors around the world. Nowadays, the matter is whether a diversified portfolio which holds assets from foreign markets is able to keep a satisfactory level of return (a given return expectation) with reduced risk. Considering the bibliography, this paper approaches various models such as Downside CAPM, International CAPM, and Weighted-Average Cost of Capital, in order to detect the impact of globalization on systematic risk level. Actually, we conclude that theory stands for the internationalization of the diversified portfolios, although empiric observation definitely shows that there is a deep consideration and hesitation among investors as far as international investing is concerned.

The remainder is as follows. Section 2 generally cites the advantages of international diversification as well as the threats that lurk. Section 3 contains the analysis of the crucial condition in order a diversified portfolio to be internationalized, namely market liberalization, as well as if an international diversified portfolio can reduce cost of capital. Section 4 explores the factors, which is possible to raise systematic risk in an international investment. Also, the CAPM is presented as a well-known benchmark for measuring risk. Section 5 presents the leading alternative and enhanced models of CAPM which are considered to be enhanced measures of risk of portfolio investments. Section 6 attempts to interpret the investors' behavior trying to answer the question why individual investors are averse to include in their diversified portfolios foreign investments. Section 7 concludes.

2. Becoming internationalized: The value and the ventures of diversification of portfolios

As it is already stated, diversification of a portfolio was first introduced by Markowitz (1952) as well as modern portfolio theory constitutes the basis of this concept (Rockefeller, 2001). However, the significance of international diversification is not one-dimensional. From one hand, there is a viewpoint which support the idea that international equity diversification reduces risk (Solnik, 1974). On the other hand, although diversification contributes to the decrease of risk, the additional, new risks that are taken when investing in foreign securities outweigh potential returns (Rockefeller, 2001). The globalization of local economies, the trade relations, and politics creates expansive reactions, which conclude to the cross-country transmission of shocks or to cross-country spillover effects. Economic crises just quicken these reactions and there is no rule that crises are the only cause and/or factor to be blamed. As a result, the relationship between countries increases risk of a portfolio that is internationally diversified. If market correlations are low, then international diversification can really be indisputably beneficial (Forbes and Rigobon, 2002). These relatively weak relations exist between emerging and developed markets as well as emerging markets generally have higher average returns, greater serial correlation, and greater volatility (Solnik, 2003).

To be more specific, nowadays an international diversified portfolio suffers from currency risk, information costs, operating risk, legal risk, and country or political risk. As Solnik (2003) states, currency risk can affect both the total return and the volatility of the investment, but it can be managed by selling futures or forward currency contracts, buying put currency options, or by borrowing foreign currency to finance the investment. Information costs include two kinds of cost sources: firstly, the accrual cost of acquiring information and secondly, the non-monetary cost which is relative to the comprehension of foreign environments. Political risk can be focused on the prohibition of profits or capital investment handling from a foreign country (Solnik, 2003). Operating risk incurs when an investor fails to make the right transactions timely (Rockefeller, 2001). Legal and political risk includes cases of corruption, lack of market experts, technology, and/or know-how as well as uncertain political environment.

Finally, although emerging markets offer diversification benefits and returns' shifts of emerging markets are less connected with the volume of returns in more developed countries, an international diversified portfolio which holds securities of emerging stock exchanges, faces additional qualitative risks. Rockefeller (2001) has pointed out that the level of risk is magnified, when a market gather some specific characteristics, such as less information, unclear accounting standards, and low investor protection. Garcia and Liu (1999) conclude that economic development plays an important role in stock market development.

3. What makes a firm attractive for an international diversified portfolio? The cases of market liberalization and cost of capital

There must be some preconditions for a diversified portfolio in order to become internationalized. Apart from any correlation between countries and stock returns, a firm's security appeals to an investor if its cost of capital is relatively low as well as stock market liberalization exists (Henry, 2000).

If an emerging country denies opening up its equity market to outside investors having restrictions on investments for outsiders, then a diversified portfolio has to limit its options by eliminating the possibility of investing in a company of this emerging market that appeals only to domestic investors. Under these circumstances, if an economy has international restrictions, then the stock price reaction will differ across markets and the volume of this reaction will differ according to the severity of these restrictions (Miller, 1999). When an economy opens up, foreign investments become legal (liberalized), and when the government of this economy allows foreigners to purchase shares of that country's stock market security, then price volatility should become global.

The notion that market liberalization has economic benefits has been stated by Levine and Zervos (1998) as well as by Errunza and Miller (2000). In particular, Errunza and Miller (2000) found that firms which can fully interact with other markets globally have diminished cost of capital rates. Cost of capital can be seriously reduced through mergers, acquisitions, foreign direct investment, and the globalization of the market. Eiteman, Stonehill, and Moffett (2006) set three compulsory rules as the conditions which make a firm appeal to an international diversified portfolio. According to Eiteman et al. (2006), the market in which a firm security is listed must have high liquidity, broad international participation, as well as its market price should be adjusted according to international standards. When the domestic economy is closed, and investors' access is restricted, there is no reason to expect domestic assets to be priced internationally (Solnik, 2003).

4. International diversification, systematic risk and the role of CAPM

A vast amount of researches have concluded that international diversified investments embody reduced systematic risk. Also, Reeb, Kwok, and Baek (1998) as well as Kwok and Reeb (2000) found that firms which decided to expand their activities globally enjoy less risk as well as there is a negative relation between systematic risk and the degree of international involvement of a firm.

If the above conclusions are to be taken for granted, companies of a local economy which have already expand their activities globally, should have reduced systematic risk and therefore, should use a lower discount rate for their global projects. As a result, an international diversified portfolio which holds firms with the same characteristics just as they are mentioned by Eiteman et al. (2006), is expected to minimize risk. Yet, there is a paradox here. In modern reality, the unknown environment of a foreign market rises up the uncertainty and makes companies to use a higher discount rate for evaluating international projects.

As Reeb et al. (1998) note, this proportional relation between systematic risk and the level of globalization is attributed to:

- exchange rate risk,
- political risk,
- the agency problem,
- asymmetrical information, and
- manager's self-fulfilling prophecies.

Regarding foreign exchange risk, it is the kind of risk that is related with the variability of exchange rates. Political risk is relative to the destabilization of the political system of a country (confiscations, rebellions, transfer of funds in and out of the country etc.). Concerning the agency problem, it is the kind of risk that is related with the potential power of managers to act according with personal will ignoring the will of agents (shareholders) (Lee and Kwok, 1988). As far as asymmetrical information is concerned, local firms can acquire and have access to more and cheaper information and raw materials than foreign competitors. Finally, the factor "manager's self-fulfilling prophecies" was analyzed by Reeb et al. (1998). The fulfilling prophecies show how a manager's pessimistic expectations about the level of success of a project conclude to the accrual increase of firm's systematic risk.

As we have mentioned above, empirical results stand up for the idea that the more internationally diversified is an investment, the more systematic risk will bear.

In addition to the literature review, a relatively simple example of the effect of systematic risk can be extracted from the CAPM:

Figure 1: Capital Asset Pricing Model (CAPM)

$$R_{jt} - R_{ft} = \beta_j (R_{mt} - R_{ft}) + \varepsilon_t$$

Figure 2: Calculation for Beta

$$\beta_j = \left(\frac{\rho_{jm} \sigma_j}{\sigma_m} \right)$$

where R_{jt} is the random return on the j th security at time t , R_{ft} is the risk-free rate at time t , β_j (beta) is the measure of the systematic risk of firm j , R_{mt} is the market return at time t , and ε_t is the mean zero error term. ρ_{jm} is the correlation coefficient between security j (ρ_{jm}) and the market and the standard deviation of the firm j (σ_j), divided by the standard deviation of the market (σ_m).

5. Alternative and enhanced models of Capital Asset Pricing Model (CAPM) as measures of risk of market investments

A) Downside Capital Asset Pricing Model (D-CAPM)

Seeking for an alternative model of CAPM (Figure 1), Estrada (2002) presented the Downside Capital Asset Pricing Model (D-CAPM). It measures the downside beta of risk of emerging market investments. The

concepts of this belief are: firstly, investors are not particularly worrisome of upside risk, while downside risk is always a problem, and secondly, since the CAPM stems from an equilibrium in which investors maximize a utility function that depends on the mean and variance of returns where the variance is assumed to be symmetric and normally distributed, it does not correctly measure the downside beta of emerging market securities.

Continuing his rationale, Estrada (2002) made use of the Mean-Semivariance and the D-CAPM to measure returns by first computing the downside standard deviation of returns. While in the widely used CAPM the standard deviation is measured by the square root of the squared sum of deviations from the mean, Estrada (2002) took the square root of the sum of the minimum of the portfolio return (R_i) minus a given benchmark return (Σ_{Bi}) or zero squared, in order to measure the downside standard deviation. The forenamed equations are shown in Figures 3 and 4:

Figure 3: Standard Deviation and Variance (or Squared Standard Deviation)

$$\sigma_i = \sqrt{E[(R_i - \mu_i)^2]} \text{ and } \sigma_i^2 = E[(R_i - \mu_i)^2]$$

Figure 4: Downside Standard Deviation (or Semideviation) and Downside Variance

$$S_{Bi} = \sqrt{E\left\{ \text{Min}\left[(R_i - (\Sigma_{Bi})), 0 \right]^2 \right\}} \text{ and } S_{Bi}^2 = E\left\{ \text{Min}\left[(R_i - (\Sigma_{Bi})), 0 \right]^2 \right\}$$

Once the downside standard deviation of returns is found, Estrada (2002) calculates the downside covariance. Concerning the “simple” CAPM, covariance is the sum of the deviations of the portfolio returns ($R_i - \mu_i$) multiplied by the deviations of the market returns ($R_m - \mu_m$). On the contrary, the downside covariance is the sum of the minimum of the deviations of portfolio returns minus the benchmark or zero multiplied by the minimum of the market return deviations or zero. The forenamed equations are shown in Figures 5 and 6:

Figure 5: Covariance

$$\sigma_{im} = E[(R_i - \mu_i)(R_m - \mu_m)]$$

Figure 6: Downside Covariance (or Cosemivariance)

$$S_{Bi} = E\left\{ \text{Min}\left[(R_i - (\Sigma_{Bi})), 0 \right] \times \text{Min}\left[(R_m - \mu_m), 0 \right] \right\}$$

Furthermore, the correlation double equation combines the covariance and standard deviation. The correlation of an asset (i) with the market (m) is given as (ρ_{im}). The downside correlation [$\Theta_{Bi(m)}$] is a measure of the downside standard deviation and the downside covariance. The equations of correlation of an asset and downside correlation are shown in Figures 7 and 8 respectively:

Figure 7: Correlation

$$\rho_{im} = \frac{\sigma_{im}}{\sigma_i \times \sigma_m} = \frac{E[(R_i - \mu_i)(R_m - \mu_m)]}{\sqrt{E[(R_i - \mu_i)^2]} \sqrt{E[(R_m - \mu_m)^2]}}$$

Figure 8: Downside Correlation

$$\Theta_{Bi(m)} = \frac{S_{Bi(m)}}{S_{Bi} \times S_m} = \frac{E\left\{ \text{Min}\left[(R_i - (\Sigma_{Bi})), 0 \right] \times \text{Min}\left[(R_m - \mu_m), 0 \right] \right\}}{\sqrt{E\left\{ \text{Min}\left[(R_i - (\Sigma_{Bi})), 0 \right]^2 \right\}} \times \sqrt{E\left\{ \text{Min}\left[(R_m - \mu_m), 0 \right]^2 \right\}}}$$

The next factor of utmost importance which D-CAPM reexamines is the most famous and frequently used measure of risk in the asset pricing theory, that is Beta (or firm-specific risk). The Beta and the downside

Beta are measured as the covariance divided by the variance. The equations of Beta and Downside Beta are shown in Figures 9 and 10 respectively:

Figure 9: Beta

$$\beta_i = \frac{\sigma_{im}}{\sigma_m^2} = \frac{E[(R_i - \mu_i)(R_m - \mu_m)]}{E[(R_m - \mu_m)^2]}$$

Figure 10: Downside Beta

$$\beta_i^D = \frac{S_{Bi(m)}}{S_m^2} = \frac{E\{Min[(R_i - (\Sigma_{Bi})), 0] \times Min[(R_m - \mu_m), 0]\}}{E\{Min[(R_m - (\Sigma_m)), 0]^2\}}$$

Apart from Estrada (2002), Butler and Joaquin (2002) created implications for asset allocation and risk management. They looked at another aspect of downside Beta, which can measure the level of normality of correlation during extremely negative stock price volatility. Using simple and well-known patterns, namely the normal model of two variables, the ARCH/GARCH econometric model, and the student t distribution, they examined the consequences of prices' hyper-volatility in every model of the above. Consistent with financial literature, Butler and Joaquin (2002) found that returns of a diversified portfolio are affected by the stock markets' correlations. In days in which stock prices change sharply and rapidly, gains from diversification may be weakened.

The CAPM is the appropriate risk-free rate (R_f) added to beta multiplied by the market risk premium where the market risk premium is the return on the market (R_m) minus the risk-free rate (R_f). Under the same rationale, D-CAPM uses an appropriate risk-free rate added to the downside Beta multiplied by the market risk premium. The equations of the CAPM and the D-CAPM are shown in Figures 11 and 12 respectively:

Figure 11: CAPM

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

Figure 12: D-CAPM

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

Finally, Estrada (2002) analyses data from the Morgan Stanley Capital Indices seeking and finding strong evidence that downside Beta clearly affects shift returns of securities especially those listed in emerging markets. It is remarkable that the D-CAPM is being taken under serious consideration by more and more academics and researchers as a reliable alternative model of the CAPM.

B) International Capital Asset Pricing Model (I-CAPM)

Another model suitable for measuring risk is the International Capital Asset Pricing Model (I-CAPM). This model was initially developed by Grauer, Litzenberger, and Stehle (1976) with a single factor. Sercu (1980) and Solnik (1983) created an extension of the single factor I-CAPM presenting the multifactor I-CAPM. According to Koedijk, Kool, Schotman, and van Dijk (2002) as well as Koedijk and van Dijk (2004), the I-CAPM extract precise conclusions in perspective with the "simple" CAPM about returns, cost of capital and risk if the firms are exposed to global risk factors.

Assume a world with "n" currencies. Then the I-CAPM has "n" systematic risk factors (the global market portfolio and "n-1" exchange rates). "Currency 0" contains the return of asset i (R_i) as well as the return of the global market (R_G). The "currency 0" measure is one which lacks of actual money and currency. Also, this measure can be defined by the requirement that prices sum to a given constant. The symbol "\$" represents the home currency of asset i, "S" is the vector of nominal exchange rate returns on the other "n-1" currencies against "currency 0". The vector (r) denotes the nominal returns on the risk-free asset in country l, and (r_f) is the risk-free rate in the home country. Finally, (t) is the vector of ones, (d_{i1}) and (d_{i2}) represent the global market betas and the exchange rate betas (Koedijk et al., 2002). The equation of the I-CAPM is shown in Figure 13:

Figure 13: International CAPM (I-CAPM)

$$E[R_i] = r_f + E[R_G - r_s] d_{i1} + E[S + r - tr_s]' d_{i2}$$

The model of I-CAPM is based on the notion that investments and capital are free of restrictions. Generally, there has been an international relaxation of limitations the last years as far as investments are concerned (Solnik, 2003). Even if some loose restrictions exist in OCED countries, direct capital controls on foreign investments are no longer as important in determining portfolio choice and asset pricing (Sercu and Uppal, 1995). These potential restrictions are related with the number of shares that can be held by foreigners as well as with the option to which industries foreigners can invest.

C) Weighted-Average Cost of Capital (WACC)

In economic theory, the selection of an investment plan signifies the exclusion of another. Capital is always narrow and an investor creates opportunity cost for his/her options, diverting funds from market to market and/or from one project to another.

The concept of the Weighted-Average Cost of Capital (WACC) provides a guide for selecting investment plans. In the equation below, the weight of equity (the ratio of market value of equity divided by the total value of equity plus debt) is multiplied by the cost of equity (R_e). This value is added to the weight of debt (the market value of debt divided by the total value of equity plus debt) multiplied by the cost of debt (R_D) and reduced by the corporate tax rate (t), in order to find the net value.

Figure 14: Weighted-Average Cost of Capital (WACC)

$$WACC = \frac{E}{E + D} (R_e) + \frac{D}{E + D} (R_D)(1 - t)$$

Bruner, Eades, Harris, and Higgins (2003) underline that in theory and especially in practice, the calculation of WACC comes up against various difficulties. The most serious and compulsory requirement is the fact that not only the cost of equity but also the cost of debt and weights should be based on current market prices as well. In addition to the above, the cost of debt should be converted to the after-tax cost of debt in order to reflect the benefits of the net interest (interest free from taxation).

6. Home Bias: Inhibitions of investors for the diversified portfolios to be internationalized

There are many advantages for a portfolio to be internationally diversified. Specifically, emerging markets offer two fundamental benefits in comparison with mature markets: higher returns and weak correlations with developed economies (Levich, 2001). Nonetheless, portfolio diversification reflects home country biases. These biases can be also encountered in equities and bonds (Levich, 2001). These inhibitions which investors have can be attributed to transaction costs, tax rates, greater resources, foreign exchange risk and possible information disadvantages. Actually, as Solnik (2003) believes, while transaction costs and taxes do exist increasing the investors' costs up to 0.75%, the additional profits exceed the extra costs.

Additionally, Solnik (2003) spots a discouraging factor for the diversified portfolios which is connected with cultural differences. Foreign culture and markets make investors feel that the "market rules" are much less the same with the ones they already know. Finally, the different languages, trading processes and time all participate in the growth of an exaggerated risk sense in front of the "unknown" (Solnik, 2003).

Flamholtz, Bullen, and Hua (2002) stress that the bigger an investor is, the more internationalized his/her diversified portfolio will be. They continue stating up the percentages with which large organizations have their diversified portfolio internationalized. For example, institutional investors invest upon foreign assets about 13% of total funds. The largest 200 corporate pension plans in the U.S.A. had an average international allocation of 16%. Furthermore, pension plans in the United Kingdom have equity allocations outside the home market of between 20-30%. On the contrary, individual investors do not lay out more than the 3% of their funds on foreign assets diversifying their portfolios almost exclusively with local equities.

Home bias seems to have been transformed into a strong belief in investors' attitude. Due to this reality, some researchers have evolved models and theories which keep up with the persistence on home assets. Baxter, Jermann, and King (1998) state that the presence of non-traded consumption goods or non-traded factors of production does not explain the high degree of "home bias" displayed by investor portfolios, as

long as individuals have access to free international trade in financial assets. They persist on the idea that it is never optimal to exhibit home bias with respect to domestic traded-good equities. By contrast, holdings of non-traded-good equities in an optimal portfolio will depend sensitively on the elasticity of substitution between traded and non-traded goods.

Lewis (1999) wrote a survey underlining that individuals do not do a good job of hedging risks across countries. Although theoretical analyses lead to the conclusion that diversified portfolios avoid to become global, empirical observation does not appear consistent with the conclusions of these analyses. Besides, in harmony with Solnik (2003), Lewis (1999) points out that potential gains clearly outweigh potential costs, when a diversified portfolio becomes expanded obtaining foreign securities too.

7. Conclusions

We look into the bibliography searching whether internationalization of a diversified portfolio can lead to lower levels of systematic risk and cost of capital. We quote a literature review of the CAPM and its alternative and more sophisticated models which show the correlation between risk and returns. We find that a vast amount of papers call into question home biases stating that the additional benefits of an international diversified portfolio outnumber the respective costs. However, empirical evidence shows that individual investors have high levels of risk aversion. To be more specific, while international investments make systematic risk to lower, other kinds of risk, such as transaction costs, tax rates, greater resources, foreign exchange risk and possible information disadvantages, are created. Investors are unable to allocate, fully understand and at the same time handle these risks and many times are driven to the choice of a regional (non-international) diversified portfolio.

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