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Home-Country Bias and International Diversification

- From an American investor's perspective

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Department of Economics, Lund University

Authors:
Ture Österman,
19960514-8577
William Bourghardt,
19970412-4875

Supervisor:
Thomas Fischer

Abstract

Purpose: This thesis examines the home-country bias of the general U.S. investor and the possibilities for such an investor to diversify internationally. Moreover, it studies the optimal distribution between foreign holdings in emerging- and developed markets. The portfolio optimizations are considered through two investor profiles, one who aims to minimize her variance and one who seeks to maximize her risk-adjusted return.

Methodology: The purpose of this thesis is achieved through a comparison between several constructed portfolios. Firstly, a base portfolio is constructed based on the holding of the general American investor, which is then compared to six other portfolios with different holdings. Moreover, various portfolios are subject to different constraints and optimizations. Further, the portfolios' performance is compared using two traditional performance measures and six alternative risk estimators. The traditional performance measurements include the Sharpe ratio and Treynor's Index. Further, a new unconventional performance measure is introduced, the Sortino ratio. Thus, the risk-adjusted return is evaluated regarding three different risk-estimates, namely the standard deviation, the beta-coefficient and the lower partial standard deviation. Moreover, the portfolios' value at risk, conditional value at risk, political risk, skewness and kurtosis are computed and used to highlight the traditional performance measures' deficiencies.

Key findings: Conclusively, this thesis suggests that the general U.S. investor exhibits a home-country bias of approximately 80%. The reason for the suboptimal allocation can partly be described by behavioral biases and the exposure to new risks and costs that foreign investments bring. However, this study concludes that both of the examined investor profiles can improve their preferable performance measure when prioritizing foreign assets from emerging markets instead of holdings in other developed markets.

Table of Contents

1. Introduction

1.1 Background

The volatility and subsequent risks of financial markets have shown its force numerous times throughout history. Consequently, investors are forced to manage their portfolio holdings with regard to their preference for risk. Diversification is one of the basic approaches to decrease a portfolio's risk. The fundamental idea to diversify one's portfolio investments stems from Markowitz's early works in 1952. In his mean-variance theory, Markowitz (1952) suggested that investors should hold low-correlated equities as a measure to reduce the risk of the portfolio. Since then, findings of low correlating returns between different markets have been presented and it has subsequently strengthened Markowitz's argument (See e.g. Levy and Sarnat, 1970; Solnik, 1974).

An established way to obtain a portfolio of equities with less correlation is to diversify internationally (Solnik, 1974). This practice has increased significantly for the past decades, partly because of its proven risk-return benefits and in connection with the deregulations of financial markets and capital flows, resulting in fewer complications investing abroad. Today, investors can invest in almost 100 capital markets existing worldwide, making the geographical diversification opportunities broad and a key segment in portfolio selection. A common distinction is often made between developed markets and emerging markets, which subsequently possess different traits, opportunities and risks (Bodie, Kane & Marcus, 2014). Furthermore, several studies have found emerging markets to have low correlated returns to developed markets. They also offer the potential for higher returns and growth (See e.g. Levy and Sarnat, 1970; Christoffersen, Errunza, Langlois & Jacobs, 2012).

However, despite the well-documented benefits of international diversification in general and towards emerging markets in particular, studies show the majority of investors around the world overweighting domestic equities in their portfolios. This irrational bias towards domestic holdings, called "home-country bias," has been widely studied. Earlier research has found it to result in suboptimal holdings (Levy and Sarnat,

1991). Thus, many investors place most of their holdings in domestic equities; meanwhile, their home-country capital market accounts for a significantly smaller share in relation to the world capital market. Subsequently, resulting in overexposure to the investors' domestic market and potentially missing out on diversification benefits.

The existence of home-country bias can partly be explained by the exposure to the new risks that investing in foreign markets bring. Various factors, such as foreign exchange rate risk, political risk and transactional cost, have to be considered as they may negatively affect the return from an investment. However, it cannot explain it alone. Behavioral biases such as familiarity and cultural aspects have proven to be of importance as well (Bodie et al., 2014).

1.2 Purpose

This thesis aims to quantify the general American investors' home-country bias and its financial consequences. The overexposure to the domestic market is evident in the U.S., which has led to using an American investor's perspective to illustrate the potential advantages and disadvantages more clearly.

By comparing two different markets, emerging- and developed markets, this thesis strives to contribute with a new perspective of how American investors' should optimally diversify internationally. In order to do so, a constructed base portfolio reflecting the general U.S. investors' holdings will be compared with another six optimized portfolios with different holdings. Accordingly, the purpose of this study is to investigate the connection between international diversification and portfolio performance.

Thus, leading this thesis to examine the following issues:

- Does the general American investor make geographically inefficient allocations when investing? If so, what are the possible reasons for this?
- Which potential benefits can the general American investor gain by exploiting the investment characteristics of emerging- and other developed markets?

1.3 Structure of the Paper

The thesis is structured as follows; In chapter 2, the study's theoretical framework is presented to provide a general understanding of the critical financial theories used in the upcoming segments. Chapter 3 further elucidates the data collection process and the methodology used to achieve the thesis's purposes. In chapter 4, the results of the study are presented and analyzed. Chapter 5 includes a discussion of the limitations and assumptions in the thesis. Lastly, the conclusions and subsequent proposals for further research are presented in Chapter 6.

2. Theory

In this section, the theoretical frameworks for this thesis are presented. The theories and earlier findings used in this thesis stem from finance and portfolio selection in particular. These theoretical frameworks will constitute the basis for the upcoming analysis.

2.1 Modern Portfolio Theory - Risk & Returns

The centrality of diversification in modern portfolio theory has been acknowledged since Harry Markowitz's presentation of it in 1952. The practice of diversification has ever since embossed finance and the decision making within it.

In his early work, Markowitz was the first to mathematically present the effects of diversification in portfolio selection (Rubinstein, 2002). By combining risk-free assets with risky assets in the same portfolio, Markowitz (1952) demonstrated that it is possible to obtain greater returns given a certain risk level. Depending on the investors' preferences and attitude toward risk exposure, optimized portfolios can be acquired through diversification. Furthermore, Markowitz's publication attests that diversification of an investors' portfolio can decrease their liability towards risk; however, not eliminate it. By adding more equities to the portfolio, the firm-specific risk diminishes. Eventually, the portfolio's only remaining risk will be the systematic risk, which cannot be removed through diversification.

Within the financial theory, two variables are of particular importance; risk and returns. The variables are firmly integrated and form a fundamental connection; assets with a higher risk are expected to yield a higher return and, contrary, assets with lower risk are likely to yield a lower return. Traditionally, the risk is measured through standard deviation and beta-value (Bodie et al., 2014).

The standard deviation is a deviation measure widely used since Markowitz's (1952) paper. It measures the spread of the equity's value around the mean over a specific time. Thus, it displays the equity's volatility in value and can thereby be interpreted as a firm-specific risk. The standard deviation of a portfolio depends on two vital factors, which can be derived from formula 1. Firstly, it depends on the individual standard deviation of the included assets and their weights in the portfolio. Lastly, it depends on the covariance between the same equities included in the portfolio.

The variance (1) and the standard deviation (2) can be calculated with the following formulas:

$$\sigma_p^2 = \sum_{i=1}^{n} \sum_{j=1}^{n} x_i \, x_j \sigma_{ij} \quad (1)$$

$$\sigma_p = \sqrt{\sigma_p^2} \quad (2)$$

Where:

- $x_{i,j}$ is the weight of the asset *i* and *j*
- σ_p^2 is the variance of the portfolio *p*
- $\sigma_{i,j}$ is the covariance between asset *i* and *j*
- σ_p is the standard deviation of the portfolio *p*

In modern portfolio theory, the beta coefficient (β) is often interpreted as an individual stock's systematic risk. It measures equity's sensitivity to the price fluctuations of the whole market (Sharpe, 1964). Accordingly, each asset can be assigned a beta-value regarding its diversions from the overall market movements. The appropriate market of one's investigation naturally has a beta-value of 1,0. Thus, if an equity fluctuates more than the given market, it will receive a beta-value greater than 1,0. If it fluctuates less, it will receive a beta-value below 1,0 (Bodie et al., 2014). Furthermore, equities with a large beta-value carry more risk but also a greater prospect of offering

potentially higher returns. Naturally, the opposite holds true for equities with small beta-values. The beta-value of an asset can be computed with the following formula:

$$\beta_i = \frac{\sigma_{iM}}{\sigma_M^2} = \frac{\rho_{iM}\sigma_i\sigma_M}{\sigma_M^2} = \rho_{iM}\frac{\sigma_i}{\sigma_M} \quad (3)$$

Where:

- $\sigma_{i,M}$ is the covariance between asset *i* and the overall market *M*
- $\rho_{i,M}$ is the correlation between asset *i* and the overall market *M*

2.2 Covariance and Correlation

When several assets are included in the portfolio, Markowitz (1952) also emphasized the importance of how the included assets move in relation to one another. Ideally, assets with low co-movement should be targeted in order to utilize the maximal benefits of diversification.

Covariance and correlation are commonly used in mathematics and statistics to measure the linear relationship between stochastic variables. However, they differ in the sense that the covariance measures how much the variables vary together and the correlation tells us how much a change in one variable leads to a change in the other (Byström, 2014).

The sample covariance (4) and the correlation (5) between two assets is calculated with the following formulas:

$$cov(r_A, r_B) = \sigma_{AB} = \frac{1}{n-1}\sum_{s=1}^{n}(r_A(s) - \bar{r_A})(r_B(s) - \bar{r_B}) = \sigma_{AB} \quad (4)$$

$$\rho_{AB} = \frac{\sigma_{AB}}{\sigma_A\sigma_B} \rightarrow \sigma_{AB} = \rho_{AB}\sigma_A\sigma_B \quad (5)$$

Where:

- $r_A(s)$ and $r_B(s)$ is the return for asset *A* and *B* at time *s*
- $\bar{r}_A$ and $\bar{r}_B$ is the mean return for asset *A* and *B*
- $\sigma_{A,B}$ is the covariance between asset *A* and *B*
- ρ_{AB} is the correlation between asset *A* and *B*
- *n* is the number of observations

Correlation is a standardized measure of covariance, which can only take a value between $-1 \leq \rho \leq 1$. A correlation coefficient of one $(\rho = 1)$ indicates a perfect positive correlation, which implies that asset A's movement will result in the same movement in asset B. Contrary, a correlation coefficient of minus one $(\rho = -1)$, referred to as a perfect negative correlation, implies the same movement of the assets but in the opposite way. Lastly, a correlation equal to zero $(\rho = 0)$ suggests that the two assets A and B are independent and have no linear connection. Between these boundaries, the correlation can also be classified as weak, moderate and strong (Byström, 2014).

2.3 Rationale for Diversification

The primary purpose of diversification is to reduce the risk of the portfolio. A single company's default's negative impact is smaller when the amount of assets included in the portfolio is high (Solnik, 1974). However, when diversifying, not only the amount of included assets should be considered, but also how the chosen equities depend on one another, i.e., correlate. Solnik (1974) examined the American investors' potential benefits from diversifying domestically and internationally to illustrate this issue. In the study, weekly price movements during the time frame 1966-1971 of three constructed portfolios were analyzed; one domestic industrially diversified portfolio containing all available equities on the U.S. stock market, one portfolio replicating the Dow Jones Industrial index and one internationally diversified portfolio with equities from the U.S. and seven European countries.

Firstly, a straightforward conclusion was drawn by comparing the first two portfolios. The domestically diversified portfolio generated a lower risk than the one replicating the Dow Jones Industrial index. Though, the marginal reduction of risk decreased rapidly in relation to added equities to both portfolios. For instance, an investor with a portfolio containing 20 domestic securities would only reduce the risk by three percent by adding another 50 different stocks to the portfolio. The reason for this is that most stock prices tend to move in the same direction; accordingly, a well-diversified portfolio within one market will still have a high correlation with the market as a whole. By extension, this implies there exists a certain level of risk that an American investor cannot go below by solely diversifying domestically. The study also found that large

markets, such as the United States, have greater diversification opportunities. The non-diversifiable risk in the U.S. market was 27%, which was lower than most of the European countries' rates (Solnik, 1974).

Secondly, by interpreting the third portfolio's results, Solnik (1974) revealed that further risk reductions could be obtained by adding the element of international diversification. By observing movements in stock prices in several countries, Solnik found that the observed countries' price movements had a low correlation. Thus, price fluctuations in the U.S. market did not affect the other countries' markets. In contrast to the first two portfolios, the marginal reduction of risk for the third portfolio did not diminish as rapidly when adding new foreign assets to the portfolio. Accordingly, a conclusion was drawn that portfolios containing a substantial amount of securities are better off diversifying in several countries. However, industry diversification proved to be more efficient for smaller portfolios. Ultimately, the third portfolio allowing for a combination of the two allocation strategies led to the lowest risk.

Moreover, investors' interest in foreign emerging markets increased in the 1990s when these assets displayed characteristics in line with Markowitz's portfolio selection strategies. Since then, the practice of international diversification has become less challenging and more sought-after. In connection with the rise of globalism and de-regulation of financial markets and international capital flows, more markets have become accessible. Additionally, studies, such as Levy and Sarnats' (1970) early study of emerging market assets, showed them to have a low correlation to their counterpart's returns, the developed markets. Thus, these findings, combined with the possibility for growth and large returns, sparked an interest in diversification towards emerging markets.

In recent times, however, the potential diversification opportunities in emerging markets have been subject of questioning. As globalization increases and emerging markets naturally approach the developed markets, many attest that the potential diversification opportunities start to evanesce. Furthermore, as the difference between the markets subsequently diminishes over time, the correlation between them increases. However, it is a frequently debated issue whether the benefits of diversifying amongst these markets are disappearing (Garza-Gómez and Metghalchi,

2006). Li, Asani and Zhenyu (2001), amongst others, support the hypothesis that emerging and developed markets are indeed integrating more but still found diversification in emerging markets to present beneficial opportunities (Christoffersen et al., 2012).

2.4 Risks associated with International Diversification

In the previous part, the company-specific risk has been discussed and how it can be reduced through diversification. In the following segment, the focus is shifted towards a new risk exposure emerging from international diversification, the market risk. This type of risk is best analyzed on a macro level, as it affects the overall market's performance (Bodie et al., 2014). Ever since its rise, international diversification has shown both its prospects and drawbacks. One of the main motives for international diversification is to avoid the disadvantages of exposure to a single market. However, investing abroad has its own complications. It entails new potential risks, such as foreign exchange rate fluctuations and political instability (Bodie et al., 2014; Bekaert and Harvey, 1995).

2.4.1 Foreign Exchange Rate

In the process of diversifying internationally, the investor faces not only the risk of uncertain asset developments but relies on the performance of the foreign currency rate relative to their home rate. Thus, an investor can recognize potential earnings from a foreign asset diminish or increase depending on how the foreign currency performs in relative terms. For instance, the return of an investment for an American investor who purchases a stock on the Japanese market depends on the asset itself in addition to the YEN/USD exchange rate development. It is possible to reduce one's exposure to currency risk by hedging; however, this method adds additional costs and may decrease the potential returns (Bodie et al., 2014).

2.4.2 Political Stability

Another risk related to international diversification is the exposure to different political climates existing in different countries. Political uncertainty, legislation, and deviating fiscal/monetary policies may simultaneously affect the overall market and single companies. Thus, potentially affecting the returns of its equities (Chevalier and Hirsch,

1981). This uncertainty theoretically exists in every market but to different extents. Additionally, obtaining thorough information regarding factors of a country's political and financial climate differs vastly depending on their development (Bodie et al., 2014). In the Political Risk Guide's (PRS) scoring tool, several political risk factors for countries are presented. Some of them include government stability, internal/external conflicts, corruption and democracy level (The PRS Group, 2020).

2.5 Characteristics of Emerging and Developed Markets

Usually, there is a distinction in the investment industry between economies classified as "developed" and those who are "emerging." The latter describes an economy that is still undergoing industrialization. Emerging markets are also characterized by a higher growth rate than the developed economies and with a capital market that generally involves more significant risks (Bodie et al., 2014).

As mentioned above, the differences between developed and emerging markets naturally lie in their level of development. However, the development stage of a country incorporates many factors and subsequent opportunities for growth. Some of the world's emerging countries have just recently developed their infrastructures, creating thorough means of trading goods, which have existed in developed countries for decades. Although these are basic development steps, such steps provide greater growth opportunities than those available for more developed markets. Furthermore, emerging markets have the opportunity to look back at the history of industrial development and thus embark on a more rapid and less insecure transition towards it. Moreover, some of the steps taken by developed markets in their industrialization might be skipped altogether, meaning emerging markets can go straight to the digital version of many industries. All of these allow emerging economies to have faster growth in relation to developed countries (Lee, 2013).

As stated earlier, in connection to the development of the emerging countries, their financial markets get more efficient and transaction costs decrease. However, investing in these markets still includes higher costs than investing in domestic ones. As shown in Diagram 1 below, Northern Trust's "Global Quantitative Management" release of 2006 found the average, one-way, transaction costs of emerging financial

markets to be 0,88%. In contrast, the general developed market has a transaction cost of below 0,4% (Schoenfeld and Cubeles, 2007).

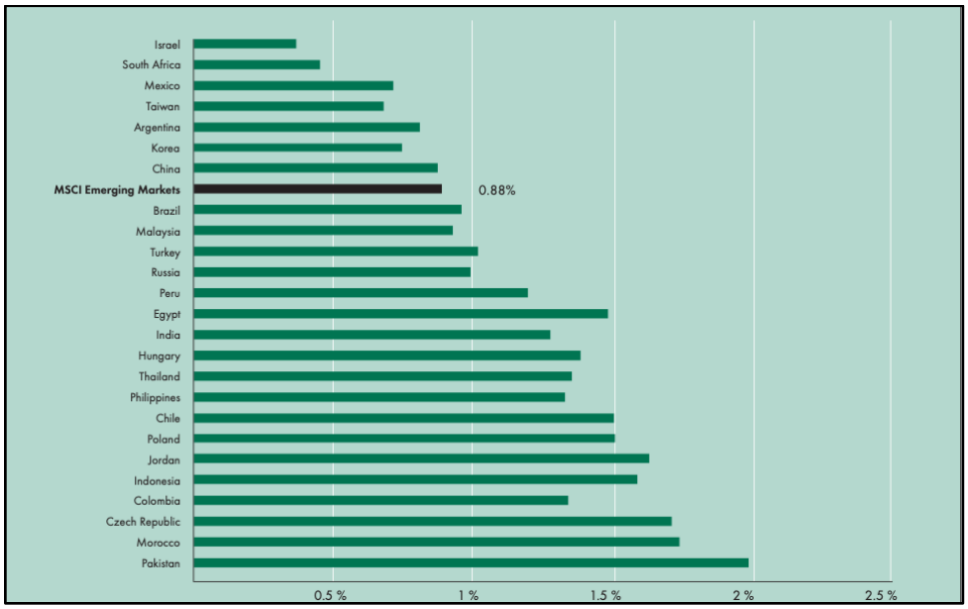

Diagram 1. Transaction costs in emerging markets (one way) (Schoenfeld and Cubeles, 2007).

Furthermore, in comparison to developed markets, the returns from emerging markets tend to follow a non-normal distribution, which brings several implications (Bekaert, Erb, Harvey & Viskanta, 1998). Mainly since many traditional models within finance rely on the assumption of normally distributed returns. In turn, this can cause suboptimal results when using data from emerging markets (Bekaert and Harvey, 1997). In addition to the need for an alternative way of estimating risk when dealing with higher-order moments like kurtosis and skewness (Harvey and Siddique, 2000). Evidence suggests that the existence of kurtosis and skewness is more significant in emerging market returns (Bekaert et al., 1998). Accordingly, investors can take advantage of this by weighting their portfolios with assets from countries whose returns are more positively skewed than the average of a specific time frame. In line with Beakaert et al. (1998), Ghysels, Plazzi and Valkanov (2016) also propose that emerging markets possess a characteristic of higher non-normally distributed returns on average in comparison to developed economies, allowing them to be more suitable targets for diversification.

2.6 Optimal Investment - In Which Market?

Markowitz's (1952) main ideas are based on the assumption that investors are rational and risk-aware. Thus, investors will choose the combination of assets that leads to the

maximal return concerning the amount of accepted risk. The exposure to higher risk should always lead to a higher return for a rational investor to consider the option of adding an asset, which implies that individual preferences, such as prioritizing domestic assets, will not be accounted for as long as it is not beneficial from a risk or return perspective. Accordingly, the only decisive part in the weight distribution process is the characteristics of the individual countries' returns and which performance improvements the country index brings by being added to the portfolio. Therefore, a portfolio is considered optimal from the modern portfolio theory perspective throughout this thesis.

2.6.1 Minimize Variance

One portfolio selection strategy is to minimize its variance. Modern portfolio theory suggests that each asset in a portfolio should be examined in how it affects the portfolio's performance as a whole. Thus, the variance and correlation between individual assets of a portfolio pose essential indicators for investors. By compounding a portfolio with country indices with low price volatilities and low correlation to one another, the investor can reduce the portfolio variance and thereby lower its risk (Markowitz, 1952).

2.6.2 Maximize Sharpe Ratio

Another investor approach to optimally compose a portfolio is to allocate the weights by maximizing the Sharpe ratio. When maximizing the Sharpe ratio, the weights are optimally distributed among all the countries so that the risk-adjusted return is maximized in the portfolio (Sharpe, 1966).

2.7 Behavioral Finance

Unlike modern portfolio theory, behavioral finance opposes the assumption that all investors behave rationally when investing. Instead, behavioral finance proposes that investors commonly make mistakes when investing, which refutes the assumption of perfect rationality. These mistakes are derived from two irrationalities. Firstly, investors process information incorrectly and secondly; they make inconsistent decisions. The latter is a result of investors letting their behavioral biases interfere in their decision making. An example of a common consequence from this is the term within behavioral

finance called “home-country” bias, which refers to the phenomenon of over prioritizing domestic stocks due to individual preferences (Bodie et al., 2014).

2.7.1 Home-Country Bias

French and Poterba (1991) first presented the phenomena of home-country bias in the early ’90s. The term describes investors’ aptness to favor domestic assets over foreign assets; such bias is still prominent but less than a decade ago. Earlier research has pointed out the existence of disproportionate high weight allocation in the domestic market even though its equity market only accounts for a fraction of the world equity space. Attempts have also been made to define the potential reasoning behind the home-country bias. Research suggests the leading causes to be transaction costs such as information costs, international tax costs and other hindering factors, as those presented in the previous section. However, these transactional costs have all shrunk with time due to the globalization and deregulation of financial markets and capital flow. Lewis’ (1999) study found that the costs of diversifying internationally had to be remarkably large to offset the potential benefits of it.

Some of the more current studies suggest other reasons behind the home-country bias. One of the standard theories refers to the information asymmetry existing between domestic and foreign equities. The argument follows that a domestic investor may face fewer challenges and costs in obtaining information about equities in her home country, thus favoring to hold domestic assets due to the informational lead (Coval and Moskowitz, 1999). As an extension of this argument, Zhu (2003) studied 78.000 U.S. retail investment in 1991-1996. The study found that investors possess home-country bias and that the phenomena could best be explained by the behavioral trait of the investors' familiarity with the equities. That is, retail investors invest in what is familiar, or local, to them and not necessarily in what they are well-informed of. Moreover, Grinblatt and Keloharju (2001) found that a company's culture, language and proximity to an investor are familiarity related facets that may affect investors' bias towards certain companies. In concurrence, Nieuwerburgh and Veldkamp (2009) suggest that domestic investors can predict equity returns in their home country more accurately than foreign investors because they are less familiar with foreign equities

(Portes and Rey, 2005). The informational ascendancy to investors holding local assets was also found with statistical significance in Zhu's (2003) study.

The inclination of home-country bias has been shown to pose a risk for investors to expose themselves to over-weighting domestic assets in their portfolios, thus disregarding the intercontinental diversification slots (Bodie et al., 2014; Lane and Milesi-Ferretti, 2003). Furthermore, domestic bias has shown to be costly as these investors will not optimally composite their portfolio when allowing for the home-country bias constraint.

Below is Fidora, Fratzscher and Thimann's (2007) simplified formula for estimating home-country bias;

$$HB_i = \frac{w_i^* - w_i}{w_i^*} = 1 - \frac{w_i}{w_i^*} \quad (6)$$

Where:

- w_i^* is the world market share excluding the investigated country
- w_i is the share of foreign assets held in the investigated country's portfolio

The home-country bias of country *i* is thus the difference in percentage between these two weights.

2.7.2 Home-Country Bias in the United States

Although many prior studies point to the potential of international diversification, especially towards emerging markets, statistics show that home-country bias still exists in the vast majority of the world. The United States is considered the largest economy globally, with a capital market that accounted for 43% of the whole world in 2018. Yet, the Investment Company Institute (ICI, 2018) found that U.S. retail investors tend to allocate up to 77% of their total shareholdings in U.S-based assets. Thus, the average U.S. investor was 34% overly weighted in domestic equities (Johnson, 2019). While the home-country bias in the U.S. remains high, it has decreased over the last three decades. French and Poterba (1991) showed U.S. investors weighing nearly 94% of their assets in the U.S. stock market in the early '90s. This kind of investment behavior is common within the investment industry and can be referred to as home-country bias.

2.8 Traditional Performance Measures

As earlier presented research suggests, emerging markets have a characteristic of higher returns than that of developed countries. However, this factor alone should not solely constitute the basis for the investment decision. Instead, the returns should be assessed in relation to the level of undertaken risk, that is, risk-adjusted returns. Looking at one parameter without the other provides an incomplete representation (Crouhy, Turnbull & Wakeman, 1999). Two of the most commonly used performance measures within finance are the Sharpe- and Treynor ratios, which both account for the relation between the two parameters.

2.8.1 Sharpe Ratio

The Sharpe ratio was first presented in 1966 by William F. Sharpe. It is a ratio of excess returns and volatility and is meant to help investors comprehend their risk-return arrangement and how they are compensated for their amount of undertaken risk (Sharpe, 1966; 1994).

The *ex-ante* formula for the Sharpe ratio is:

$$S_P = \frac{\bar{r}_P - \bar{r}_f}{\sigma_P} \tag{7}$$

Where:

- $\bar{r}_P$ is the realized average portfolio-return
- $\bar{r}_f$ is the average risk-free rate of return
- σ_p is the standard deviation of the portfolio (overall risk)

Furthermore, the *ex-post* Sharpe ratio is derived as the formula above, except for using realized returns instead of expected returns. As this thesis will examine historical returns, which are, by definition realized, the ex-post ratio will be used. Given the formula, a high Sharpe ratio implies that the portfolio's expected returns are high in relation to its undertaken risk.

2.8.2 Treynor's Index

Treynor's (1966) measure resembles the Sharpe ratio because it also relates the excess return with an underlying risk. However, instead of using standard deviation in the denominator, Treynor's index uses a beta-variable (β) for systematic risk. The beta-value is used to capture macroeconomic shocks and thus display different equities vulnerability to them (Bodie et al., 2014). Consequently, Treynor's Index is very useful for analyzing internationally diversified portfolios. Moreover, a high Treynor index implies that the portfolio reproduces a high risk-adjusted return. The formula to calculate Treynor's index is:

$$T_P = \frac{\bar{r}_P - \bar{r}_f}{\beta_P} \quad (8)$$

Where:

- $\bar{r}_P$ is the realized average portfolio-return
- $\bar{r}_f$ is the average risk-free rate of return
- β_p is the beta-value of the portfolio

2.9 Deficiencies of the Traditional Performance Measures

The Sharpe- and Treynor ratio are both derived from realized returns, which means that they follow a "backward-looking" methodology. Accordingly, observed values in the past make the only basis for the portfolios' performance evaluation in this study. However, there is no guarantee that the past returns will follow the same pattern in the future (Francis and Kim, 2003). Therefore, the optimal portfolios constructed in this thesis are not intended to form a strategy for future investment but more of an example of how risk reduction can be obtained through international diversification.

One implication with Treynor's Index lies in the impossibility to sufficiently define and create a proxy of the overall market portfolio. As the beta-value in the denominator is intended to measure an individual asset's responsiveness to changes in the overall market, the model becomes highly dependent on using a correct benchmark to capture it accurately (Roll, 1977).

Lastly, the assumption of market returns to be normally distributed is shared within the traditional portfolio selection models. It simplifies the procedure notably as the standard deviation can be viewed as a thorough risk-gauge, leading to measurements like the Sharpe and Treynor's ratio to be assumed to be a rigorous performance measure (Bodie et al., 2014). However, extensive earlier research has found non-normality in the distribution of returns to be of frequent presence (e.g., Bakshi, Kapadia & Madan, 2003). The reason for this can be derived from the high amount of extreme values existing in the returns, which is likely caused by a negative skew and a higher kurtosis in the distribution. While the assumption of normally distributed returns simplifies the calculations, it can also lead to misleading results.

2.10 Adjusted Performance Measures

This section aims to provide an alternative way of computing portfolio risk when accounting for the asymmetry in the return distribution. One way to deal with the asymmetry is to focus on the negative outcomes separately. In order to emphasize the negative extreme values better, two new risk measures are introduced in this segment; Value at Risk (VaR) and Conditional Value at Risk (CVaR). Further, a new performance measure, the Sortino ratio, which uses downside risk in the calculations, is introduced (Bodie et al., 2014).

2.10.1 Downside Risk Measures

Value at Risk (VaR) is an alternative way to measure risk compared to the standard deviation. It measures the possibility to lose a certain amount, or more, from a single period by looking at the value of a predetermined low percentile of the entire return distribution. Expected shortfall is a modified variant of VaR and can also be referred to as Conditional Value at Risk (CVaR). While both measures evaluate tail risk, CVaR focuses only on the left-hand side of the mean, i.e., the extreme losses. Instead of looking at one value of a specific percentile, it computes the average loss of all values in the lowest percentile (Bodie et al., 2014).

The CVaR is calculated as:

$$CVaR = \frac{1}{1-c} \int_{-\infty}^{VaR} xp(x)\, dx \tag{9}$$

Where:

- *c* is the chosen VaR breakpoint in the distribution
- *VaR* is the chosen VaR-degree
- *p(x) dx* is the likelihood of getting *x* in return

2.10.2 Sortino Ratio

As mentioned before, the returns in modern portfolio theory are assumed to follow a normal distribution. The disadvantage of the assumption is that it can cause the Sharpe ratio to become insufficient when estimating risk via the standard deviation if the returns are not normally distributed. Thus, the possibility of extreme events to occur is underestimated with the standard deviation (Bodie et al., 2014). However, the Sortino ratio is an extension of the Sharpe ratio and is developed to take these extreme values into account.

The Sortino ratio was first presented in 1980 and stemmed from Frank A. Sortino (Sortino, 2009). Contrary to the Sharpe ratio, the Sortino divides the average excess return by the lower partial standard deviation (LPSD) as its risk measure. The lower partial standard deviation is derived as the standard deviation, except for only using the negative excess returns in its calculation. Thus, the Sortino ratio addresses one of the common problems faced when dealing with non-normality in the return distribution. By only examining the negative excess returns, the LPSD can be said to derive the standard deviation of the left tail of the distribution. Accordingly, this ratio is useful when evaluating portfolios with non-normally distributed returns (Bodie et al., 2014). However, this method has also received criticism, mostly because of the high rank-correlation between the Sortino- and Sharpe ratio. Eling and Schuhmacher (2007) found the correlation to be 0,99, thus questioning Sortino's superiority in the mentioned areas. The Sortino ratio formula is:

$$S_p = \frac{(\bar{r}_p - \bar{r}_f)}{\sigma_{LPSD}} \tag{10}$$

Where:

- $\bar{r}_p$ is the realized average portfolio-return
- $\bar{r}_f$ is the average risk-free rate of return
- σ_{LPSD} is the lower partial standard deviation (LPSD)

A high Sortino ratio suggests that the portfolio's expected returns are high in relation to its undertaken level of "bad" risk.

The lower partial standard deviation formula is:

$$\sigma_{LPSD} = \frac{\sum_{i=1}^{m}(r_i - \bar{r}_f)^2}{m-1}, \ where\ r_i < \bar{r}_f \quad (11)$$

2.10.3 Skewness

Skewness relates to the statistical distribution and is used in finance to measure asymmetry in the return distributions. A non-normal distribution can be positively or negatively skewed. A normally distributed asset return would have no skewness, although, in reality, most do exhibit skew in some form (Bodie et al., 2014).

To measure this asymmetry in distributions, the skewness is calculated as:

$$\frac{1}{n} \sum_{i=1}^{n} \left(\frac{r_i - \bar{r}_i}{\sigma}\right)^3 \quad (12)$$

Where:

- $(r_i - \bar{r}_i)^3$ is the cubed deviations from the average
- σ^3 is the cubed standard deviation

If a distribution is positively skewed, the distribution's right tail is "longer," and the opposite applies if it is negatively skewed. Furthermore, if a distribution is positively skewed, the risk is overestimated by the standard deviation. Contrary, if it is negatively skewed, the risk is thus underestimated by the standard deviation. Naturally, the second instance poses greater unease to investors (Bodie et al., 2014).

2.10.4 Kurtosis

Kurtosis is an additional significant measure of the deviation from normally distributed returns. It measures the "fatness" of the tails and is commonly interpreted as the probability of observing extreme values on either side of the mean. A normal distribution has an excess kurtosis equal to zero. However, if the distribution has an excess kurtosis that exceeds zero, it is called leptokurtic. A leptokurtic distribution has

a greater likelihood to generate extreme values simply because it has fatter tails than a normal distribution, which means it has a greater probability mass in the tails of the distribution than at the center of the distribution. Implicitly, a distribution with a negative excess kurtosis is called platykurtic and has a lower probability of generating extreme values. A consequence of having an excess kurtosis deviating from zero in the distribution is that models based on standard deviation as a risk measure will underestimate the possibility of extreme events (Bodie et al., 2014). The excess kurtosis of a distribution can be computed with the following formula:

$$\frac{1}{n}\left[\frac{(r_i-\bar{r}_i)^4}{\widehat{\sigma^4}}\right]-3 \qquad (13)$$

Where:

- $(r_i-\bar{r}_i)^4$ is the fourth power of the deviations from the average
- $\hat{\sigma}^4$ is the fourth power of the standard deviation

3. Data and Method

In this part of the thesis, the study's technical aspect is described, including data collection, data processing, and the methodology used to reach certain results.

3.1.1 Data Collection

The primary data was gathered from Morgan Stanley's Capital International (MSCI) country indices. The indices contain price movements of domestic mid and large-cap stocks, covering up to 85% of the various countries' equity universe. The indices are reviewed quarterly to capture changes in the underlying equity markets and rebalanced to ensure that the companies meet the requirements to be included (MSCI, 2020). Monthly closing prices, adjusted for dividends and converted into USD, were collected from 46 different countries during 2000-2019. With a division of 50% emerging countries and 50% developed countries to highlight the issue of this thesis. The indices serve as good financial instruments as they represent the country's stock market on a broader scale compared to individual stocks. In this thesis, each country index represents one asset class. Consequently, it is only possible to allocate the whole country index to the portfolio and not individual equities.

Moreover, another critical aspect of the study is to capture the general American investment allocations. Thus, data from the International Monetary Fund's (IMF) "Coordinated Portfolio Investment Survey" was retrieved. The survey contains data on portfolio investment assets by sector and economy of nonresident issuers. By excluding institutional investments and the limitations of only covering equity and investment fund shares from nonfinancial corporations and households, the general U.S. household investment patterns could be examined. This data was then used to construct the U.S. Reflective Portfolio.

Data on the three-month U.S. Treasury Bills with secondary market rates from 2000-2019 were gathered from the U.S. Department of the Treasury. The risk-free return rate is a hypothetical rate used to resemble a risk-free asset's return in various financial calculations (Bodie et al., 2014). Many of the formulas presented in the theory section require the returns to be converted into excess returns. This is commonly done by subtracting the return with a proxy for a risk-free rate. Government bonds are often used for this purpose due to their low risk of defaulting. As the emphasis in this paper is on the American investor, U.S. Treasury Bills serve as a reasonable proxy for the risk-free return rate.

The gross domestic product (GDP) for each of the 46 countries was also collected to demonstrate the differences in growth between emerging- and developed markets and the individual countries' growth rate. This data was gathered from the World Bank database and subsequently processed in excel. The data was mainly used to create the GDP-growth based portfolio.

3.1.2 Data Processing

Each country's monthly return was defined as the percentage difference in its index's closing price for each month. The price variability has served as estimates for risk measures and returns over the examined time frame. The formula used to calculate the monthly returns were as follows:

$$r_i(t) = \frac{P_i(t) - P_i(t-1)}{P_i(t-1)} \tag{14}$$

Where:

- $P_i(t)$ is the closing price for country *i* at time *t*
- $P_i(t-1)$ is the closing price for country *i* at time *t-1*

To match the returns, which are expressed on a monthly basis, the three-month treasury bill rates had to be converted into monthly rates (15). These, were in turn, used to compute the average monthly risk-free rate (16). The average monthly risk-free rate was then subtracted from the portfolios' expected returns to obtain the monthly excess returns.

$$r_{f_{month}} = (1 + r_{f_{3-month}})^{1/3} - 1 \quad (15)$$

$$\bar{r}_{f_{month}} = \frac{\sum r_{f_{month}}}{n} \quad (16)$$

The data retrieved from the IMF survey covers Americans' investment assets of nonresident issuers. The weights of the foreign investments in the U.S. Reflective Portfolio were computed with formula 17. The U.S-based equity holdings for American households had to be computed individually with the formula presented in 2.7.1.

The weights in the foreign countries were then adjusted after incorporating the domestic allocations in the U.S.

$$w_i = \frac{v_i}{v_M} \quad (17)$$

Where:

- v_i is the value of investments in the country *i*
- v_M is the total value of U.S. investors' holdings in *the studied market universe*

As discussed in the theory part, the precision of the Treynor Index relies on the correct usage of a benchmark to measure the beta-value. In order to capture the country-indices individual sensitivity towards changes on the overall market, a "World Index" was created by combining the naively weighted average movements of all included countries in this study. By doing so, the World Index could be used as a benchmark as it reflects the average price movement of the overall studied universe.

Moreover, the exchange rate development can heavily affect the potential earnings or losses of investments abroad. It is possible to reduce one's exposure to currency risk by hedging; however, this method adds additional costs and may decrease the potential earnings. Thus, the foreign exchange rate must be considered when investing in foreign assets (Bodie et al., 2014; Bartram, Brown & Minton, 2010). Throughout this thesis, all prices were converted to USD and the foreign exchange rate fluctuations were thereby accounted for.

3.1.3 Data loss

Upon collecting data on monthly closing prices for the countries in the MSCI indices, it was discovered that data was missing for some of the countries in the relevant period of this study. If these were to be included, the calculations would prove insufficient for those countries and were subsequently excluded from the study. The countries with insufficient data were Saudi Arabia, Qatar and the United Arab Emirates.

3.2 Methodology

3.2.1 Definitions

Furthermore, definitions and classifications of whether a country is developed or emerging differ among the literature. In this thesis, MSCI's "Classification Framework" was used to maintain consistency in the definition. In the MSCI (2020) "Market Classification Framework," three central aspects are considered when determining whether a market is emerging or developed:

1. The country's economic development.
2. The size and liquidity of the companies in the country.
3. The country's market accessibility.

These criteria are supposed to reflect the general investment industry's perception of the market while maintaining index stability. The first criterion is based on the country's gross national income (GNI). To be classified as developed, the country needs to have had a GNI per capita of 12,376 USD or above for three consecutive years. The second criterion aims to capture the country's companies' size and security liquidity based on

market capitalization and annualized traded value ratio. The last criteria is intended to reflect the institutional investor's experience of investing in different markets. By examining the market's openness, efficiency, stability and transactional costs, the level of market accessibility is determined.

3.2.2 Limitations & Assumptions

Jensen (1967) found that a common problem within finance is to find a suitable measure for evaluating how good a specific portfolio is performing. The difficulty lies in defining risk while also considering different risk preferences that investors might have. In order to deal with this, many financial models require certain assumptions to be made. The traditional measures rely on the same assumptions;

- All investors are rational in the sense that they are risk-averse and seek to maximize their wealth.
- Information on expected returns and the amount of variety is the only basis for investors' decision-making. The standard deviation of the returns and the returns are assumed to follow a normal distribution.
- There exists no transaction costs nor taxes.

In addition to the assumptions mentioned above, further limitations and assumptions have been made in this thesis. They are essential to acknowledge as they have a decisive role in the study's results.

- While there are over 100 capital markets worldwide, this study only covers the 46 countries categorized as either developed or emerging by MSCI (Appendix D). Thus, the investment universe for the general American is narrowed down.
- The examined time frame in this study is limited to 2000-2019. Implying, historical data of 20 years has been used to reach conclusions.
- The portfolios in this study aim to capture the long term perspective of investment. The allocations in the portfolios are therefore assumed to be constant over the whole period.
- No short sales were allowed in the portfolio construction process.

The reasoning behind and subsequent implication of these assumptions and limitations will be discussed in chapter 5.

3.2.3 Portfolio Construction

The optimization of the constructed portfolios was performed through the perspective of two investor profiles. The first profile seeks to minimize her risk, which is captured by optimally minimizing the variance. In contrast to the second profile, who desire a maximized risk-adjusted return, which is done by optimally maximizing the portfolio's Sharpe ratio.

As this thesis aimed to describe the general American investor's allocations in relation to various optimal allocations, seven different portfolios were constructed (Table 1). Firstly, a reflective, non-optimized portfolio was created to mirror the generalized holdings of an American household amongst the chosen countries of this study, i.e., 80% in the U.S. and the other countries weighted, respectively. Secondly, an optimized, min-variance portfolio with no constraints was created to demonstrate how this investor-profile should distribute its weights optimally. Thirdly, an optimized, max-Sharpe portfolio with no constraints was created to reveal how that investor-profile should weigh her holdings. Fourth and fifth, both of the above-mentioned optimized portfolios were created again but with the constraint of 80% allocation in the U.S., thus reflecting the general American investor's home-country bias and its impact. Lastly, two portfolios with value-based- and naive diversification were constructed. The weights were allocated based on the country's GDP-growth over the studied time in the value-based portfolio. For the naive portfolio, the weights were dispersed equally in all 46 countries.

Portfolio	Optimization	Constraint
A	None	Reflective allocation
B	Min-variance	None
C	Max-sharpe	None
D	Min-variance	Home-country bias (80% in U.S.)
E	Max-sharpe	Home-country bias (80% in U.S.)
F	None	GDP-growth based diversification
G	None	Naive diversification
A-G		*No short sales*

Table 1. The portfolios created in this study, along with their optimization and constraints.

Additionally, a constraint against negative holdings, i.e., short positions, were set for every portfolio throughout the study. Many emerging countries held either explicit or inexplicit regulations against short-sales during the examined time-period (Gupta and Donleavy, 2009).

The expected return, variance and the Sharpe ratio were calculated for each portfolio. Additionally, to calculate the value at risk and the conditional value at risk, the 95% VaR and CVaR were derived for each portfolio to allow for the possibility of extreme losses in the risk-estimate. Furthermore, the Treynor index and the Sortino ratio were calculated for all portfolios to include alternative measures of risks, specifically systematic risk through the beta-value and downside risk through the LPSD. Moreover, the skewness and kurtosis in the returns were calculated for all 46 countries. This was done to demonstrate the asymmetry in the return distribution likely caused by skewness and kurtosis. This can thus provide a reason to assume that different results would be obtained if the assumption of normality in the distribution of returns would be dismissed.

Subsequently, this thesis compared seven different portfolios with two traditional performance measures, in addition to six risk measures. This was done to perform a thorough examination of several portfolio composement strategies and international diversification opportunities. The portfolios were then ranked with regards to their performance in the various measures above.

4. Results and analysis

4.1 Monthly returns, standard deviation and beta-values

The results from the conducted study on monthly returns, standard deviations and beta-values during 2000-2019 are shown in diagrams 2, 3 and 4 below.

By looking at Diagram 2, one can observe that most emerging countries have had higher average monthly returns than developed countries during the studied time frame. Thus, with one clear exception of Greece, which has had a negative average

monthly return of -0,8%. On the other hand, Colombia is the country with the highest average monthly return of 1,26%. Other emerging countries with remarkable high returns are Peru, Russia and Indonesia. In terms of developed countries, Denmark stands out in the sense of having the highest monthly average return of 0,87%. The United States average monthly return is just above the average of 0,346% for the developed countries.

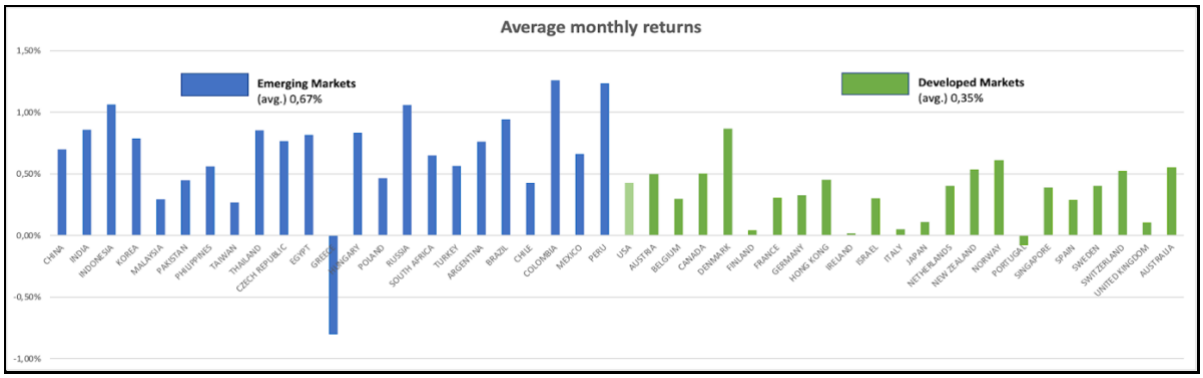

Diagram 2. Bar chart over the average monthly returns for each country during 2000-2019. The emerging country's bars are blue and the developed country's bars are green.

The standard deviation study (Diagram 3) shows that a clear majority of the emerging countries have had higher standard deviations in their returns during 2000-2019 compared to the developed countries. Turkey is the country with the highest standard deviation among all countries. This implies large fluctuations in Turkey's returns and consequently makes it the riskiest country to invest in from that perspective. Compared with the U.S., that has displayed the lowest standard deviation during the same time frame and can accordingly be considered the least risky alternative with the reversed argument.

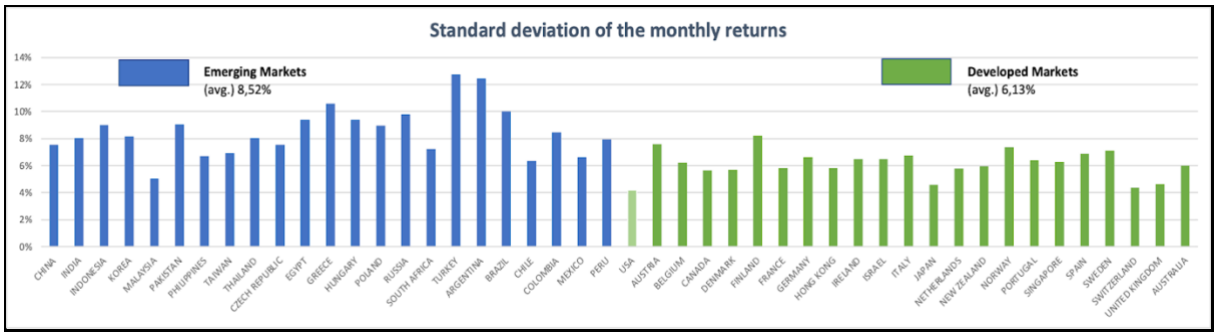

Diagram 3. Bar chart over the standard deviation of each country's monthly returns during 2000-2019.

Diagram 4 displays the amount of systematic risk in terms of beta-values. Turkey is the country with the highest beta-value, implying a high sensitivity against fluctuations in the overall market. However, it does not necessarily have to be negative since high responsive return movements work in both directions. In other words, if the return of

the overall market increases by 1%, Turkey's returns are likely to increase by 1,55%; likewise, if the return of the overall market decreases by 1%, Turkey's returns will decrease by 1,55%. Japan's index has the lowest beta-value and can be argued to be least affected by fluctuations in the overall market. Fewer fluctuations make the market more predictable, which can be considered favorable from a risk perspective.

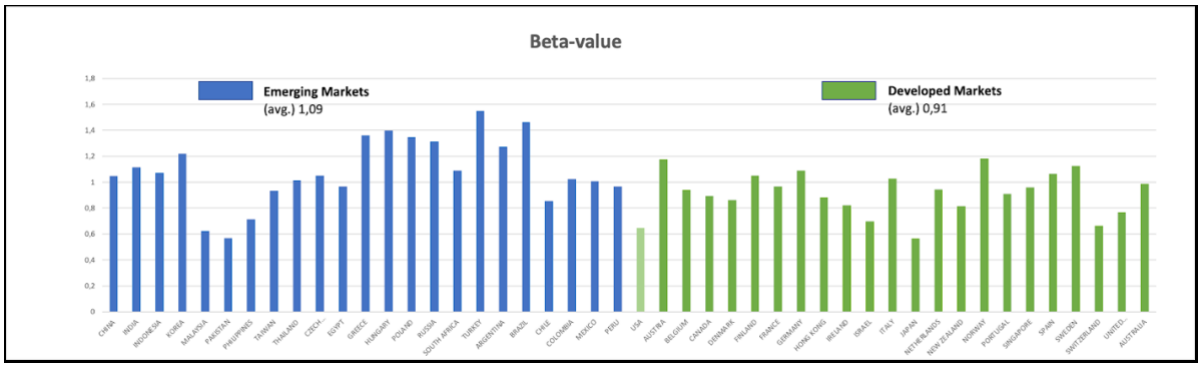

Diagram 4. Bar chart over the beta-values of each country during 2000-2019.

On average, the emerging markets have had a higher monthly return and higher standard deviation during 2000-2019 compared to the developed markets. The average monthly return is almost twice as big, while the average standard deviation is nearly 40% higher for the emerging markets. Thus, this result is in line with Bodie et al.'s (2014) claim that emerging markets' capital markets have a characteristic of higher risks. The difference in standard deviation implies that the firm-specific risk is higher in emerging markets. In terms of returns, Ghysels et al. (2016) found that emerging markets also have a characteristic of higher returns on average, which can be confirmed by the monthly return study. The average beta-value within the emerging markets is also higher, which implies a higher systematic risk in these countries as well.

Diagram 5 captures the relationship between the returns from Diagram 2, adjusted to excess returns, and the standard deviations from Diagram 3. The top three countries with the highest Sharpe ratio are Peru, Colombia and Denmark. From the earlier presented results, it is known that Colombia and Peru had the highest average monthly returns. Yet, both countries' standard deviation is below the average for emerging markets, which has led to high Sharpe ratios. In contrast to Denmark, which gained a high Sharpe ratio for having semi-high monthly returns and a lower standard deviation. The U.S. index performed above the developed countries' average but below average in relation to the emerging countries.

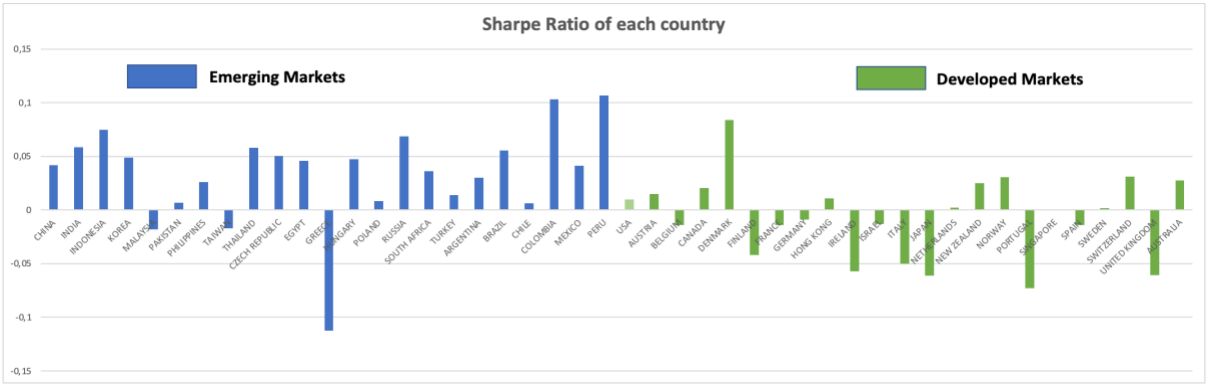

Diagram 5. Bar chart over the Sharpe ratio of each country during 2000-2019.

4.2 Correlation

Based on the outcome from the correlation study, an increase in correlation can be observed between the emerging and developed markets from the first examined year to the last one. In 2000 the average correlation between the distinguished markets was almost 0,26 and in 2019, it had reached a level of 0,57 (Diagram 6). However, the correlation does not consistently increase between the years but instead varies up and down. Therefore, it cannot be statistically confirmed that the correlation increases over time as the outcome depends heavily on which time period is selected. However, the linear trendline implies that the different markets' correlation increases marginally over this study's examined time frame. This result is partly supported in the theory section, where Garza-Gómez and Metghalchi (2006) proposed that the difference between distinct markets diminishes over time, leading to an increased correlation between them.

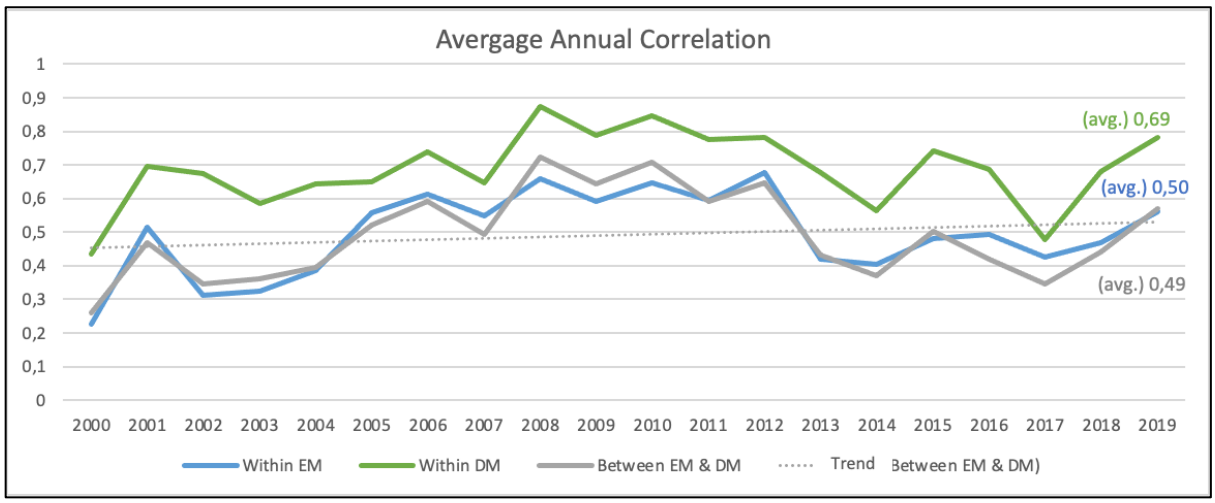

Diagram 6. Graph over the average annual correlation within and between the emerging and developed markets during 2000-2019. The dotted line is the linear trend line for the correlation between EM's and DM's.

The correlation within the developed markets has consistently been higher than the correlation within the emerging markets during the examined time-frame, implying that the developed countries are more integrated. The average correlation within the emerging countries is marginally higher than the correlation between the two separated markets, which correspond to Levy and Sarnats' (1970) claim that the two opposing markets are less correlated in general. From the general American investor's standpoint, one can strongly argue that greater risk reductions can be obtained by focusing the international diversification towards emerging markets instead of other developed countries. This argument is also supported by Li et al. (2003) and Christoffersen et al. (2012), who advocated for the potential diversification benefits that diversifying in emerging markets brings despite the claim that the markets are getting more integrated.

The U.S.'s average annual correlation with emerging and other developed markets has increased between 2000 to 2019. The correlation with emerging markets has gone from 0,2629 to 0,5964, a percentage increase of approximately 117%. While the correlation with the developed countries also has increased, its correlation has only had a percentage increase of 15%, from 0,7215 to 0,8261, during the same time frame (Diagram 7). However, it is likely that the correlation to the developed countries had already experienced a similar phase like the emerging countries, as Solnik's (1974) study found that the correlation between the U.S. and seven European countries; Belgium, France, Germany, Italy, Netherlands, Switzerland and the United Kingdom had almost no correlation at all during 1966-1971. The same countries are included in this study (Table 3) and all of them have had a strong positive average correlation with the U.S. between 2000-2019.

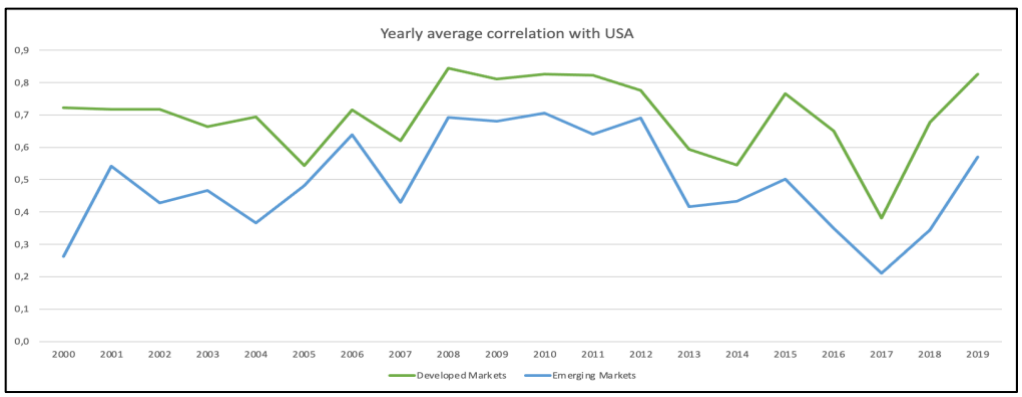

Diagram 7. Graph over the average annual correlation between emerging- and developed markets with the U.S. during 2000-2019.

All countries positively correlate with the U.S. during the examined time frame, meaning every country's returns move more or less in the same direction as the returns in the U.S. index. The country with the least positive correlation to the U.S. is Pakistan and the country with the strongest correlation is the United Kingdom (Table 2 & 3). According to Markowitz's (1952) modern portfolio theory, countries with a lower correlation to the U.S. should present a better investment alternative for an American investor who aims to reduce her portfolio risk. While all countries display a positive correlation with the U.S. during 2000-2019, the total average correlation is approximately 20 percentage points lower for the emerging markets than developed markets. Following this argument, the result implies that the general American investor with a high holding of U.S. equities should be better off diversifying the portfolio with assets from emerging markets instead of other developed markets.

Correlation with USA	Correlation
CHINA	0,6267
INDIA	0,5374
INDONESIA	0,4369
KOREA	0,6877
MALAYSIA	0,4624
PAKISTAN	0,2215
PHILIPPINES	0,4474
TAIWAN	0,6155
THAILAND	0,5194
CZECH REPUBLIC	0,5106
EGYPT	0,3349
GREECE	0,5444
HUNGARY	0,5930
POLAND	0,6228
RUSSIA	0,5878
SOUTH AFRICA	0,5993
TURKEY	0,5249
ARGENTINA	0,3625
BRAZIL	0,5884
CHILE	0,5430
COLOMBIA	0,4262
MEXICO	0,7034
PERU	0,4211
Average EM	0,5181

Correlation with USA	Correlation
AUSTRIA	0,6633
BELGIUM	0,7204
CANADA	0,7887
DENMARK	0,7139
FINLAND	0,6781
FRANCE	0,8141
GERMANY	0,8240
HONG KONG	0,6620
IRELAND	0,7167
ISRAEL	0,5810
ITALY	0,6885
JAPAN	0,6174
NETHERLANDS	0,8239
NEW ZEALAND	0,6130
NORWAY	0,7053
PORTUGAL	0,5878
SINGAPORE	0,6819
SPAIN	0,6857
SWEDEN	0,7859
SWITZERLAND	0,7425
UNITED KINGDOM	0,8259
AUSTRALIA	0,7381
Average DM	0,7117

Table 2 & 3. Average correlation with the U.S. during 2000-2019 for emerging and developed countries.

4.3 Home-Country Bias

To estimate the general home-country bias of U.S. investors, Fidora et al.'s (2007) simplified formula for home-country bias was applied. The results suggest that a U.S. investor in 2019 generally possessed a home-country bias of approximately 80%. Moreover, the results showed that of the remaining 20% slot, 83% was dispersed within other developed markets and a mere 17% in emerging markets. This can be put in perspective to earlier studies, French and Poterba's (1991) study found a home-country bias of nearly 94% for U.S. investors. Thus, the domestic bias has diminished

in recent times. However, a bias of 80% still heavily outweighs the U.S. equity-markets share of the total world market sphere.

Furthermore, this study has presented various possible causes for the existence of home-country bias. Firstly, international diversification's currency-risk arising with the foreign exchange rate development for the given countries. Since the perspective of an American investor is used, investments in the U.S. market are the only ones not subject to exchange rate risk. Secondly, the potential transaction- and information costs associated with foreign investing, encompassing transaction fees and international taxes. As presented in Diagram 1, the average transaction costs of investing in emerging markets are 0,88%, with some countries reaching as high as over 1,5%, compared to the developed markets' average of 0,4%. These higher costs might further push the bias towards domestic markets for some investors.

Moreover, foreign countries' political risks, including their level of democracy and economic stability, subsequently affect the investment environment. As observable in Diagram 8, the average political risk rating of 1995 for emerging markets was approximately 60 compared to just over 81 for developed markets. Thus, the developed markets pose a significantly lesser threat regarding political risk, which might also sway U.S. investors towards investing domestically.

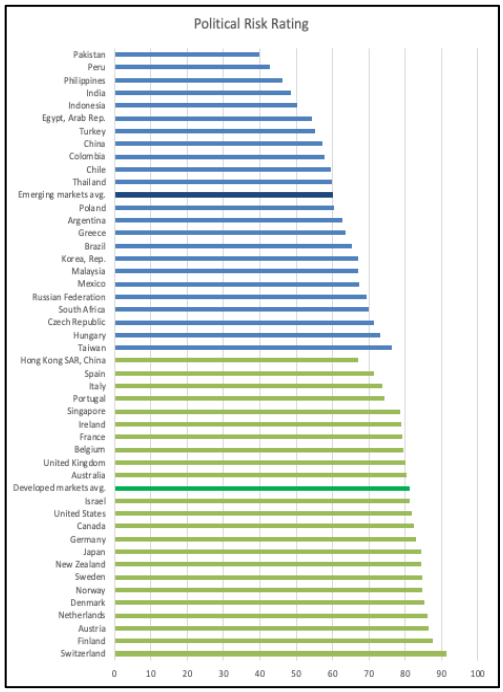

Diagram 8. Political risk rating for each country in 1995, 0-49,9 is "very high risk" and 80-100 is "very low risk" (PRS Group, 1995).

Furthermore, other possible behavioral reasonings for home-country bias have included the investors' familiarity with the asset. It has been suggested that investors invest in what is familiar to them; factors such as language, culture and proximity are argued to affect the investors' preferences. Extensionally, research has also found that investors predict movements in domestic equities more accurately than in foreign ones. Studies have also found that information is easier and less costly to access for domestic equities (See Coval & Moskowitz, 1999; Zhu, 2003). Thus, resulting in certain investors' preference for home-country holdings.

4.4 Allocation of Portfolio Weights

4.4.1 Portfolio A - U.S. Reflective Portfolio

This portfolio aims to illustrate the geographical allocation that the general American has in her portfolio. Following the results of U.S. investors' home-country bias, this portfolio contains 80% U.S-based assets. The remaining 20% is dispersed, with 83% in other developed countries and 17% in emerging countries. The circle chart on the right-hand side shows how the remaining 20% is distributed between the 45 countries. This sort of geographical allocation proves that the home-country bias is very high for the general American investor. The dominating allocation towards other developed countries implies another irrational investment behavior as these countries, on average, are more correlated to the U.S. than the emerging ones. While the reason for this is not statistically confirmed, a reasonable argument for this can be derived from biases presented in behavioral finance. A developed country can be assumed to share a more similar culture and closer proximity to other developed markets than to the emerging ones. Further, the largest individual foreign holding of this portfolio is allocated in the United Kingdom, which is a country that shares the same language with the U.S. Thus, as supported by earlier research (See Grinblatt & Keloharju, 2001; Portes & Rey, 2005), the familiarity of various country investment options can be assumed to have a substantial impact on investment decisions. Consequently, contributing to the suboptimal distribution done by the general American investor.

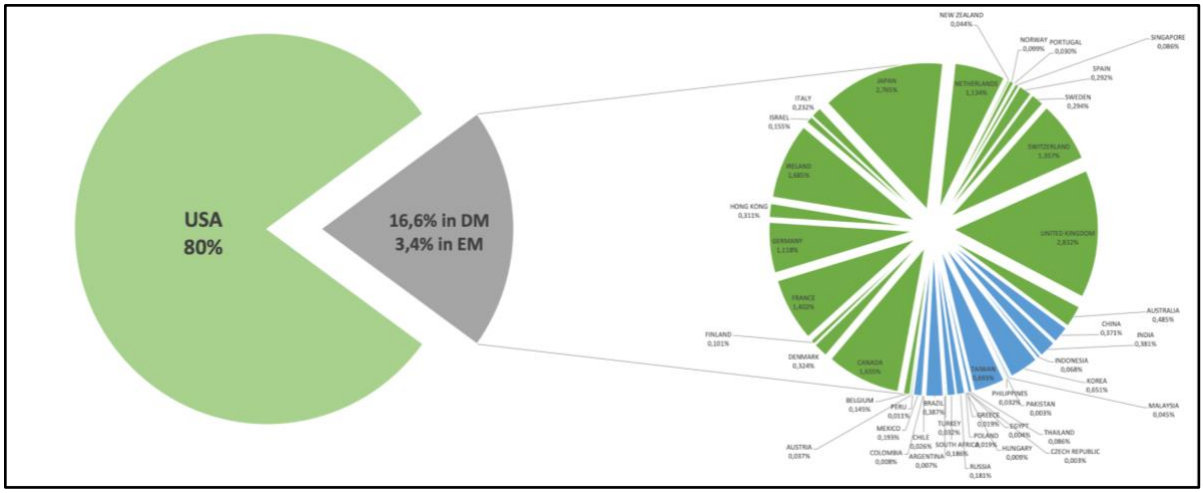

Figure 1. Portfolio A: U.S. Reflective Portfolio.

4.4.2 Portfolio B: Optimal Portfolio - Minimized Variance

Portfolio B was constructed to generate the lowest variance possible and the weights are distributed in line with Markowitz's (1952) theory of minimizing the portfolio risk; country indices with a low standard deviation and a low covariance to the other included indices are targeted. Accordingly, this portfolio is optimal from a traditional risk perspective. Figure 2 illustrates the composition of the portfolio; approximately 32,14% of the total weight is allocated in emerging markets and 67,86% of the weight is distributed in developed markets, including the U.S. Further, the allocations were dispersed to seven countries, whereas "Other DM's" include two developed markets and "EM's" include four emerging markets.

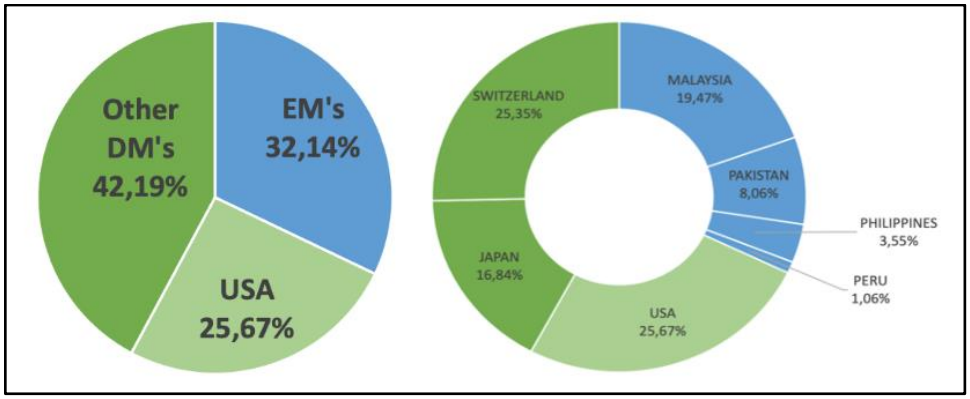

Figure 2. Portfolio B: Optimal Portfolio - Minimized Variance.

4.4.3 Portfolio C: Optimal Portfolio - Maximized Sharpe Ratio

Portfolio C was constructed to generate the highest Sharpe ratio possible. The portfolio's risk is still essential, but the returns have a more vital role in this portfolio.

Hence, the weight allocation is optimal from a traditional risk-adjusted return perspective. The portfolio's holdings are distributed within three emerging markets and one developed market, with no allocation in the U.S. (Figure 3). In this portfolio, Peru holds the largest singular position, and together with Colombia, the emerging markets combined determine a predominant weight of 71,82%. The remaining 28,18% is distributed to the developed country Denmark.

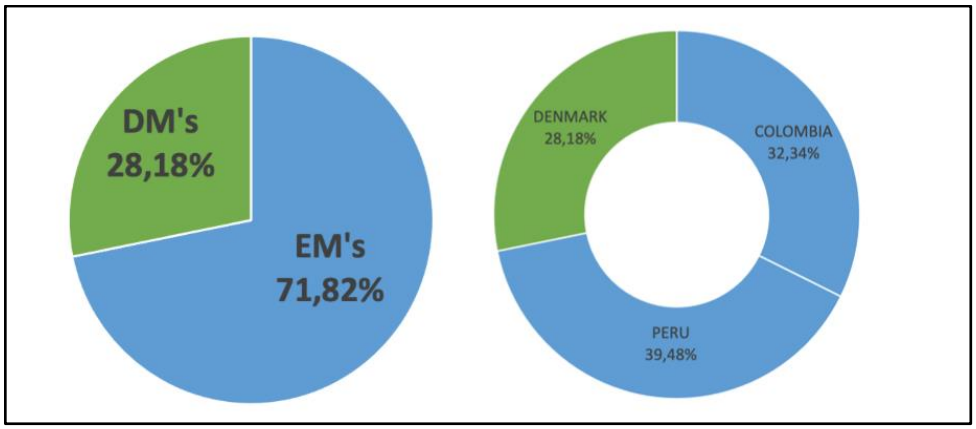

Figure 3. Portfolio C: Optimal Portfolio - Maximized Sharpe ratio.

4.4.4 Portfolio D: Suboptimal Portfolio - Minimized Variance

Like Portfolio B's construction, the weights in Portfolio D were also distributed by minimizing the variance; however, with a home-country bias constraint of 80% weight allocation in the U.S. The remaining 20% were spread within three different countries; 11,79% in Malaysia, 4,95% in Pakistan and 3,72% in Japan. Aside from the allocation in the U.S., this portfolio has a predominant allocation in emerging markets. Roughly 81% of the remaining 20% is distributed in emerging markets and only 19% in the developed market Japan. Compared to Portfolio B's allocations, 57% of the portfolio's weight, excluding the U.S., was allocated in other developed markets and 43% in emerging countries. However, with an 80% holding in the U.S., the capacity for including other countries is limited and the correlation aspect becomes more vital. Thus, with the results from the correlation study in mind, it is reasonable to include more emerging countries in this portfolio, even though they have a higher standard deviation on an individual level. This portfolio serves as a good alternative for an American investor who wants to keep her U.S-based assets but reallocates the last 20% to reduce the portfolio risk.

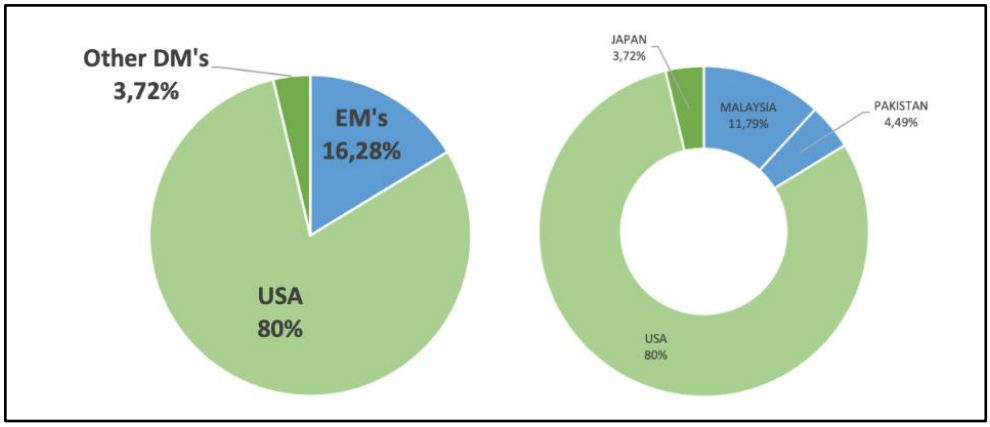

Figure 4: Portfolio D: Suboptimal Portfolio - Minimized Variance.

4.4.5 Portfolio E: Suboptimal Portfolio - Maximized Sharpe Ratio

Portfolio E was constructed by maximizing the Sharpe ratio with the home-country bias constraint. The remaining 20% were spread within two emerging countries; 10,57% in Colombia and 9,43% in Peru. Compared to Portfolio C, which had a division of 72% in emerging markets and 28% in a developed country, the allocation made in this portfolio, excluding the U.S., is directed 100% in emerging markets. Accordingly, both portfolios with the home-country bias constraint have increased their relative allocations towards emerging markets compared to the optimal portfolios. In extension, this portfolio serves as a good alternative for an American investor who wants to keep her U.S-based assets but reallocates the last 20% to improve the portfolio's risk-adjusted return.

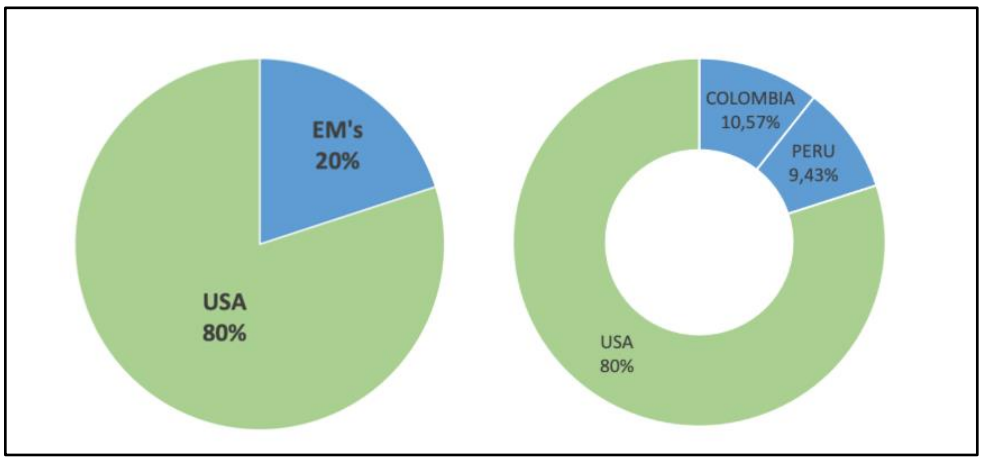

Figure 5. Portfolio E: Suboptimal Portfolio - Maximized Sharpe ratio.

4.4.6 Portfolio F: GDP-growth Based Diversification

Each country's weight in Portfolio F is based on the individual country's GDP-growth during the period 2000-2019. In this portfolio, 68,54% is allocated to emerging markets and 31,46% to developed markets. Since China has had the highest average GDP-growth during 2000-2019 (Appendix B), it determines the biggest weight here. After China, the allocations in the emerging countries Indonesia, Russia and India are the largest, implying high GDP-growth for these countries.

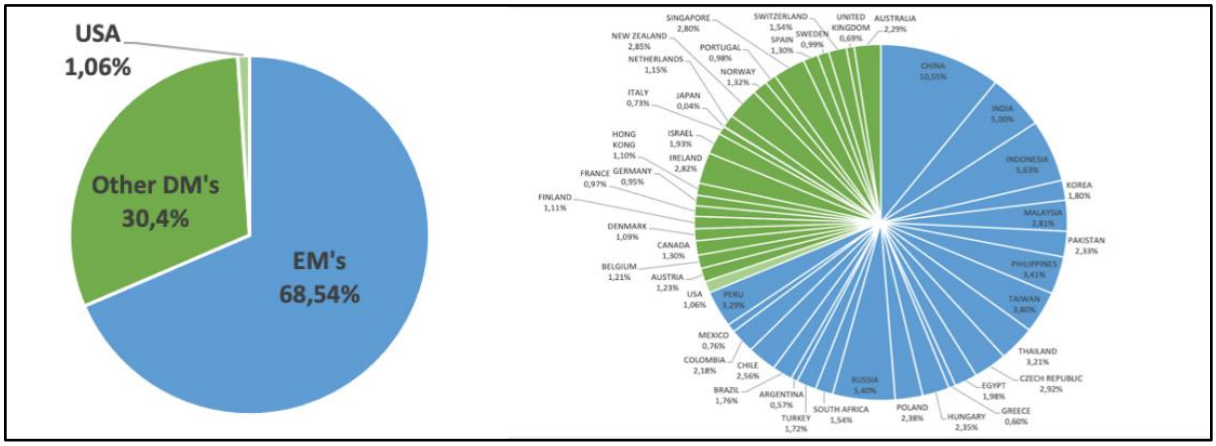

Figure 6. Portfolio F: GDP-growth based diversification.

4.4.7 Portfolio G: Market Portfolio - Naive Diversification

Portfolio G was constructed through naive diversification. It contains equally distributed weights in all 46 countries, which results in a weight of approximately 2,17% in every country. This portfolio serves the purpose of being the "overall market", when computing the beta-value of each portfolio.

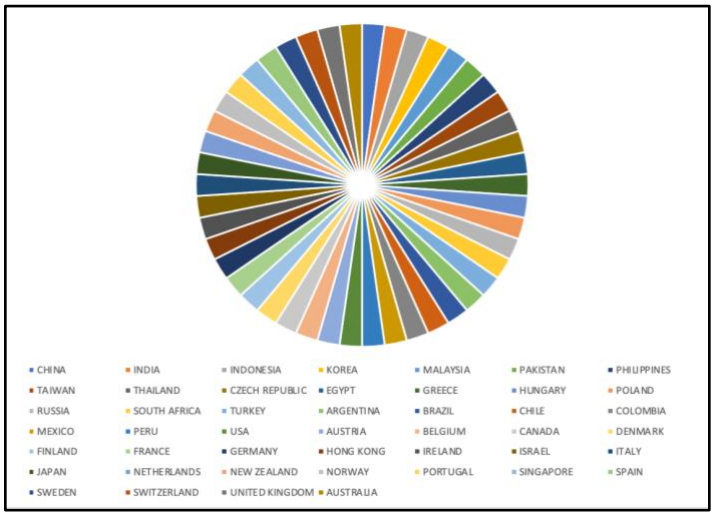

Figure 7. Portfolio G: Market Portfolio - Naive diversification.

4.5 Traditional Performance Evaluation of the Portfolios

In order to evaluate the performance of the portfolios presented above, two performance measures have been calculated for every portfolio; the Sharpe ratio and Treynor's Index. The results from the study are compiled in Table 4 below. Furthermore, the portfolios' returns and risk measures are presented in the same table, as they also form a crucial standing point for drawing conclusions in this section.

Performance Measure	Portfolio A	Portfolio B	Portfolio C	Portfolio D	Portfolio E	Portfolio F	Portfolio G	Average
Expected Return	0,4123%	0,3880%	1,1408%	0,4024%	0,5934%	0,6290%	0,5094%	0,5822%
Variance	0,1786%	0,1298%	0,3501%	0,1510%	0,1788%	0,2976%	0,2840%	0,2243%
Standard Deviation	4,2263%	3,6034%	5,9172%	3,8864%	4,2281%	5,4551%	5,3294%	4,6637%
Beta-Value	0,69	0,63	0,96	0,64	0,72	1,01	1,00	0,81
Sharpe Ratio	0,005766	0,000018	0,127238	0,003730	0,048606	0,044196	0,022786	0,0360487
Treynor's Index	0,000351	0,000001	0,007876	0,000227	0,002864	0,002380	0,001214	0,0021306

Table 4. Performance measures for each portfolio. From best to worst in tonality, green symbolizes the best performing, yellow middle-performance and red the worst.

4.5.1 Performance of Portfolio A

Portfolio A performed worse than average in terms of return-based measures. Together with F and G, this portfolio is the most geographically spread portfolio in terms of the number of countries included. It contains assets from all 46 countries, even though it is mostly small fractions from several countries. 16,6% of the portfolio's weight is allocated in other developed countries and only 3,4% in emerging markets. Consequently, the portfolio's total weight in developed countries summarizes to 96,6%. In addition to the most prominent foreign allocation in the UK of roughly 2,8%, which is notably the country with the strongest correlation to the U.S. Accordingly, the general American investor's diversification can be considered inefficient from a modern portfolio theory perspective. Markowitz (1952) discussed the importance of targeting assets with low correlation to obtain greater diversification benefits in the portfolio. Further, from the correlation study presented earlier, it has also been shown that other developed markets have displayed a higher correlation with the U.S. compared to emerging countries during the examined time frame.

In terms of risk measures, its standard deviation and beta-value are lower than the average. Despite the portfolio having a high allocation in developed markets, the portfolio's firm-specific risk and systematic risk are just slightly below the average. This stands in contrast to the risk study in section 4.1, where it was demonstrated that

developed markets have a characteristic of significantly lower standard deviation and beta-values. This also implies an inefficient geographical allocation within the portfolio.

While this portfolio is both industrially and internationally diversified, it is not optimal. Therefore, it is of interest how it should be redistributed optimally in order to obtain greater results. Solnik (1974) suggested that the marginal effect of risk reduction decreases faster from domestic diversification than international, which speaks in favor of an increase in international diversification. However, Solniks' study was based on observations from 1966-1971 and many economists have since then claimed that the distinct markets have become more and more integrated, which might have caused diminished benefits with international diversification.

4.5.2 Performance of Portfolio B

Despite having the lowest variance and beta-value, Portfolio B performed worst on both performance measurements. A contributing factor to this is the portfolio's considerably low expected return, which is marginally higher than the risk-free rate. In this portfolio, 67,86% of the weight is distributed among three developed countries. The U.S. holds the largest individual position of 25,67%, which can be motivated by the standard deviation study, where the U.S. has the lowest standard deviation of all countries. 25,35% is allocated in Switzerland, which has the second-lowest standard deviation among all countries but a strong positive correlation to the U.S. Further, 16,84% is allocated in Japan, which can be motivated by the correlation and standard deviation study, where Japan had the third-lowest correlation with the U.S. among the developed markets and the third-lowest standard deviation of all countries. The remaining 32,14% is weighted in four different emerging countries. 19,47% in Malaysia, 8,06% in Pakistan, 3,55% in the Philippines and 1,06% in Peru. In contrast to the other emerging markets, Malaysia is the only one with a standard deviation below the average for developed countries. Additionally, Pakistan is the country least correlated to the U.S.

The relatively even distribution between emerging- and developed country holdings in this portfolio is also beneficial from a correlation perspective. The earlier presented result revealed that the individual markets' average correlation is lower than the

correlation within the respective markets. Although Portfolio B has a reasonably even allocation between the distinct markets, it still has the second-lowest beta-value among all portfolios, implying it is less fluctuating than the overall market. However, the fact that a U.S. Treasury bill is likely to yield a similar return makes it a bad investment option. Though, the allocation could be used to a lesser extent for an American investor who is risk-averse.

4.5.3 Performance of Portfolio C

This portfolio has both the highest Sharpe ratio and Treynor's Index out of all portfolios. Even though the variance and beta-value are relatively speaking very high for this portfolio, it still has the highest expected excess return in relation to the two underlying risk factors. Accordingly, it can be established that this portfolio has a very successful ratio of returns concerning its existing firm-specific and systematic risks. Three country indices are allocated into this portfolio, 71,82% weighted in two emerging markets and the remaining 28,18% was allocated to the developed country Denmark. Even though Denmark had the highest average return among all developed countries, Russia, Indonesia and Brazil had higher average returns but are not included in this portfolio. Thus, the high allocation to Denmark can not be explained based on the returns themselves, but instead, the relatively low standard deviation compared to the emerging countries. On the other hand, the significant allocations to Peru and Colombia can be motivated almost solely by looking at their high returns. Under the examined time period, both countries have had the highest average monthly returns by far. Further, Peru and Colombia's correlation with Denmark are almost ten percentage points below the average for the gathered emerging countries (Appendix A). Accordingly, it makes them suitable targets for maximizing the Sharpe ratio in the portfolio.

While this portfolio is the most optimal choice for an American investor who seeks to maximize her risk-adjusted return, it is also the portfolio that has the most significant risk in terms of standard deviation along with the third-highest beta-value. Even though Portfolio C is optimal from a modern portfolio perspective, it is essential to acknowledge that the geographical allocations done in the portfolio differ a lot from the general Americans' distribution. Thus, if all investors were rational, the general

American investor would most likely imitate the allocation done in Portfolio C. However, the tangible difference indicates that the existence of behavioral influence is significant for American investors. Therefore, such investment allocation would suit an American investor with a higher tolerance for risk exposure and is willing to deviate from the generally high existing home-country bias.

4.5.4 Performance of Portfolio D & E

The U.S. Reflective Portfolio is best analyzed in contrast to the optimized variants with the same domestic allocation, i.e., Portfolio D and E. Remember that the general American investor tends to overweight the portfolio with domestic assets and with assets from other developed countries, the total weight in developed countries excluding the U.S. was 16,6%, leaving a small space of 3,4% for emerging countries.

In comparison to Portfolio A, lower risk-factors can be observed in Portfolio D. One explanation for this is that the allocation division between developed markets and emerging markets has shifted. In Portfolio D, 16,28% of the total portfolio weight is dispersed among emerging countries and the last 3,72% is allocated in a developed country. This is almost the opposite distributional relationship of what the U.S. Reflective Portfolio has. Based on the standard deviation study, it is known that emerging markets have a higher standard deviation than the developed markets on average. Therefore, one would reasonably assume that this would be negative for the portfolio. However, because the home-country bias is of such significance in this portfolio, the correlation aspect with the U.S. has to be taken into consideration. Both Malaysia and Pakistan have a much lower average correlation with the U.S. compared to the developed markets (Table 2 & 3), which most likely has led to a higher risk reduction in this portfolio. Even though Portfolio D performed worse than Portfolio A on both traditional performance measures, it could still be a wise alternative for a risk-averse American investor who wants to keep the U.S-based holdings but reduce the risk of the portfolio slightly.

The same allocation shift can be observed in Portfolio E, except that it contains only assets from emerging countries beyond the 80% placed in the U.S. index. However, Malaysia, Pakistan and Japan have been replaced with Colombia and Peru. This

redistribution made Portfolio E perform better in most categories, except with a marginally higher variance and beta-value. The large allocation in Colombia and Peru has already been justified in 4.5.3 based on their high average returns. Additionally, Colombia and Peru have a relatively weak average correlation with the U.S., both around 0,42, which is approximately six percentage points lower than the average for the emerging markets.

Under the constraint of keeping the strong home-country bias in the U.S., this reallocation would be preferable for the general American investor looking to improve the trade-off between risk and returns.

4.5.5 Performance of Portfolio F & G

From 2000 until 2019, the average GDP-growth for the developed countries has been 141%, in comparison to 302% for the emerging ones (Appendix B). Thus, resulting in an allocation of 68,54% in emerging markets and 31,46% in developed ones for Portfolio F. Portfolio F's performance is above average even though it contains slightly higher risk factors than the naively diversified portfolio.

While Portfolio F offers better risk-adjusted returns than Portfolio G, the argument for investing in emerging markets simply based on their high GDP-growth rate does not entirely hold. In this study, other factors such as correlation and market returns have been shown to be of importance for the overall performance.

4.6 Deficiencies of the Traditional Performance Evaluation

One implication with the Sharpe- and Treynor ratio is that they are ordinal measures, meaning the different values of the portfolios can be ranked, but it is not possible to state differences between the values in any meaningful way. Consequently, the rank score is simply based on the portfolios' values, with no consideration or adjustment for how much they differ.

Also, the accuracy of the performance study can be questioned. Sharpe's and Treynor's theories rely on the assumptions of rational investors, homogenous information processing and no transaction costs. The fact that neither of these

performance measures accounts for transaction costs or taxes makes them less reliable in that sense. Because, in reality, additional costs are often associated with foreign investments. As displayed in the theory-section, the average transactional costs of investing in emerging markets are 0,88%. The same costs for investing in developed countries are below 0,4%. Thus, foreign investments in emerging markets incorporate a higher cost, which affects the potential returns. Consequently, the allocation of domestic assets would likely have been higher if the models would have taken it into consideration.

Moreover, as shown in Table 5 below, the political risk score for the portfolios differ significantly. Portfolio A performs best and Portfolio D second-best. These portfolios contain a substantial majority of their holdings in developed markets, 96,6% and 84%, respectively. Contrary, Portfolios C and F performed the worst. These are the two portfolios with majority holdings in emerging markets. Thus, the results suggest that portfolios containing extensive holdings in developed markets are subject to less political risk than those containing large holdings in emerging markets. The political risk factor is not included in any of the performance measures used in this thesis. Thus, the allocation results can be assumed to have been significantly different if this factor were to be included.

Political Risk	Portfolio A	Portfolio B	Portfolio C	Portfolio D	Portfolio E	Portfolio F	Portfolio G
Score	81,28	76,81	59,62	78,30	75,59	65,93	70,70

Table 5. The political risk score for each portfolio. From best to worst in tonality, green symbolizes the best performing, yellow middle-performance and red the worst.

Another crucial aspect to emphasize is that the returns are assumed to follow a normal distribution in modern portfolio theory. However, the existence of non-normal distributed returns in emerging countries has been discussed throughout this thesis. If the models would account for non-normal distributed returns instead, the result would likely look different. In the upcoming section, this will be analyzed further.

4.6.1 Downside Risk Measures

The results from the alternative risk study are presented in the table below. From the column “VaR(95%)”, one can observe a 5% risk that the average emerging country’s monthly return will decrease by 13,53% percent, or more, in a single month (Table 6).

The same value for the developed countries is approximately three percentage points lower (Table 7). The second column, “CVaR(95%),” displays the average loss in percent based on a specific country’s worst 5% returns. Even in this case, the emerging countries’ average loss is more significant than the average developed ones. The three countries with the lowest CVaR are all developed countries; Switzerland, the U.S., Japan and the U.K. Conversely, the three countries with the worst CVaR are all emerging countries; Greece, Turkey and Argentina. However, the spread among the emerging countries is much more significant.

Value at Risk	VaR(95%)	CVaR(95%)
CHINA	-13,33%	-17,29%
INDIA	-12,70%	-16,84%
INDONESIA	-13,27%	-19,39%
KOREA	-13,80%	-16,57%
MALAYSIA	-8,91%	-11,19%
PAKISTAN	-13,06%	-20,14%
PHILIPPINES	-11,09%	-14,60%
TAIWAN	-10,98%	-14,47%
THAILAND	-11,75%	-18,55%
CZECH REPUBLIC	-10,81%	-15,29%
EGYPT	-14,02%	-19,37%
GREECE	-19,56%	-26,61%
HUNGARY	-15,93%	-22,34%
POLAND	-13,52%	-18,19%
RUSSIA	-15,06%	-21,39%
SOUTH AFRICA	-11,81%	-15,37%
TURKEY	-20,03%	-28,18%
ARGENTINA	-21,09%	-28,06%
BRAZIL	-14,81%	-21,00%
CHILE	-9,71%	-13,74%
COLOMBIA	-13,04%	-16,19%
MEXICO	-11,03%	-14,94%
PERU	-11,76%	-16,03%
Average EM	-13,53%	-18,51%

Value at Risk	VaR(95%)	CVaR(95%)
USA	-7,74%	-9,64%
AUSTRIA	-11,64%	-18,67%
BELGIUM	-9,56%	-15,63%
CANADA	-8,81%	-12,73%
DENMARK	-9,20%	-13,41%
FINLAND	-14,51%	-19,97%
FRANCE	-11,20%	-14,08%
GERMANY	-11,82%	-16,36%
HONG KONG	-9,57%	-13,47%
IRELAND	-12,21%	-17,02%
ISRAEL	-12,18%	-15,05%
ITALY	-12,78%	-15,49%
JAPAN	-7,83%	-10,05%
NETHERLANDS	-9,80%	-14,51%
NEW ZEALAND	-9,24%	-13,40%
NORWAY	-10,17%	-17,70%
PORTUGAL	-10,52%	-15,14%
SINGAPORE	-10,60%	-15,35%
SPAIN	-10,98%	-15,55%
SWEDEN	-13,12%	-16,97%
SWITZERLAND	-6,81%	-10,43%
UNITED KINGDOM	-7,10%	-10,47%
AUSTRALIA	-9,25%	-14,43%
Average DM	-10,29%	-14,59%

Table 6 & 7. Value at risk and conditional value at risk with the confidence level of 95%.

However, by comparing the portfolios with the new risk measure and the traditional variance, a generalized pattern can be detected. Firstly, 75% of the portfolios which have improved their ranking when measuring risk with CVaR instead of standard deviation consist mostly or entirely of holdings in developed markets. Conversely, ⅔ of the portfolios which have dropped their ranking with CVaR mostly consist of emerging countries. When measuring risk with CVaR instead of standard deviation, the developed markets are assigned a relatively lower risk and the emerging markets a higher relative risk. Furthermore, the two portfolios (A & D) that exhibit the lowest CVaR are also the ones with the largest allocations in developed markets. Since CVaR is more adapted to capturing the possibility of extreme losses than the standard deviation, the conclusion can be drawn that emerging markets incorporate higher downside risk. In two portfolios, B and E, the internal ranking between VaR and CVaR differs. Portfolio B worsened its rank with CVaR, in contrast to Portfolio E, which

improved its rank with CVaR. Implying that Portfolio B has more negative extreme values than Portfolio E (Table 8). This is reasonable since Portfolio B has a more considerable weight in emerging countries.

Downside Risk	Portfolio A	Portfolio B	Portfolio C	Portfolio D	Portfolio E	Portfolio F	Portfolio G	Average
VaR (95%)	-8,18%	-8,34%	-11,45%	-8,12%	-8,68%	-11,91%	-12,16%	-9,83%
CVaR (95%)	-10,45%	-11,30%	-15,34%	-10,31%	-10,93%	-16,55%	-16,86%	-13,11%

Table 8. Value at Risk (VaR) and Conditional Value at Risk (CVaR) for each portfolio.

4.6.2 Sortino Ratio

Even though volatility is desirable within the positive returns and not within the negative returns, the Sharpe ratio does not account for this distinction as it penalizes the portfolio's performance for both the up-and downside risk. However, the Sortino ratio only considers the "bad" risk by measuring the lower partial standard deviation. Hence, this risk measure has exhibited new risk-adjusted returns, which are graphically illustrated in Diagram 9.

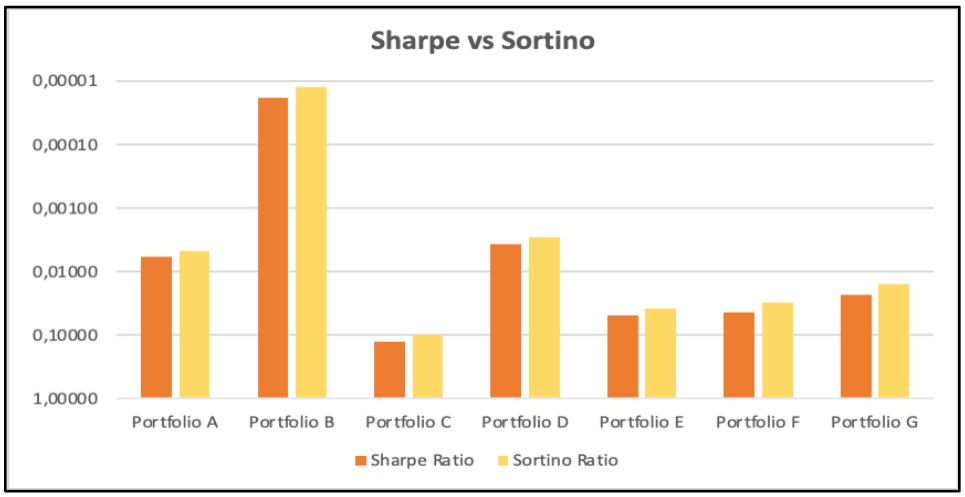

Diagram 9. Sharpe- and Sortino ratio displayed on a logarithmic scale with the base of 10.

As evident in Diagram 9, the portfolios' ranking is identical when measuring with the Sharpe- and the Sortino ratio. Thus, the new risk-measure does not significantly affect any portfolio to bump their rank either up or down. Research of Eling and Schuhmacher (2007) suggested that the Sharpe- and the Sortino ratio are strongly positively correlated, which seems to concur with this study's results. However, the percentage change in the risk-adjusted returns for each portfolio when going from the Sortino to the Sharpe ratio is still of great interest. The average percentage change for all of the portfolios is 25,2%. All portfolios which contain 80% U.S-based equities lie below the average percentage change, meaning that the shift from the standard

deviation to the lower partial standard deviation as a risk measure affected them less than average. Moreover, this suggests that they performed better relative to those who had a percentage change over the average when measuring the risk with the downside risk measure instead. Thus, implying that these portfolios exhibit lower volatility within the negative returns.

The average lower partial standard deviation is also higher for the average emerging country; however, the difference from the regular standard deviation is more significant for the developed countries (Table 9). Nevertheless, there are specific implications when measuring risk with downside deviation. Since the observational selection is limited to negative returns, the sample size is reduced significantly. The amount of observation is crucial for the result to be statistically noteworthy and this could consequently cause the accuracy to decrease.

Average:	Emerging Markets	Developed Markets
LPSD	8,59%	6,63%
Regular SD	8,52%	6,13%
Percentage Difference	0,82%	7,57%

Table 9. Difference between the average lower partial standard deviation and the regular standard deviation for emerging- and developed markets.

4.6.3 Skewness and Kurtosis

In the conducted research on deviations from the normal distribution, kurtosis and skewness measures have also been calculated on an individual level for every country, presented in table 10 and 11 below. During the observed time frame, the developed countries' returns have been more negatively skewed than the emerging countries. Only six countries have a positive skewness and all of those belong to the emerging market category. While the countries with the most negative skewness, Belgium, Ireland and the Netherlands, are all developed countries. In accordance with this, Bekaert et al. (1998) suggested that the emerging markets generally have a higher skewness on average and should, therefore, be prioritized in the allocation of the portfolio. Contrary, the measured kurtosis shows that the developed markets, on average, have higher values compared to the emerging markets. Conclusively, both markets' returns have characteristics of a non-normal distribution.

Emerging markets	Skewness	Kurtosis
CHINA	-0,4138	0,6243
INDIA	0,0446	1,7726
INDONESIA	-0,2457	2,0923
KOREA	0,0965	0,8455
MALAYSIA	-0,2358	0,9079
PAKISTAN	-0,3104	5,1452
PHILIPPINES	-0,1216	0,8119
TAIWAN	0,1467	1,4407
THAILAND	-0,1586	2,6476
CZECH REPUBLIC	0,0672	1,5764
EGYPT	0,1246	2,1806
GREECE	-0,4056	0,9989
HUNGARY	-0,5133	2,2482
POLAND	-0,0168	0,8679
RUSSIA	-0,0869	1,4728
SOUTH AFRICA	-0,3249	0,1886
TURKEY	0,0021	1,0102
ARGENTINA	-0,0915	2,7103
BRAZIL	-0,0907	0,6574
CHILE	-0,2481	1,2703
COLOMBIA	-0,0721	0,3392
MEXICO	-0,5581	1,6615
PERU	-0,2569	1,7419
Average EM	-0,1595	1,5310

Developed markets	Skewness	Kurtosis
USA	-0,6114	1,2308
AUSTRIA	-0,8534	3,6544
BELGIUM	-1,3052	5,8350
CANADA	-0,5356	2,5292
DENMARK	-0,6702	2,4236
FINLAND	-0,1355	2,3127
FRANCE	-0,4641	0,9195
GERMANY	-0,4518	1,4419
HONG KONG	-0,3380	1,1938
IRELAND	-0,8065	1,9362
ISRAEL	-0,1913	1,4229
ITALY	-0,3201	0,4336
JAPAN	-0,2032	0,3270
NETHERLANDS	-0,7619	2,0731
NEW ZEALAND	-0,4940	0,8265
NORWAY	-0,6814	2,7720
PORTUGAL	-0,5358	1,0999
SINGAPORE	-0,5963	3,0071
SPAIN	-0,2359	1,1255
SWEDEN	-0,2051	1,7605
SWITZERLAND	-0,4945	0,6390
UNITED KINGDOM	-0,3232	1,2953
AUSTRALIA	-0,4902	1,7881
Average DM	-0,5089	1,8281

Table 10 & 11 Amount of skewness and excess kurtosis in each emerging and developed the country's return distribution.

The distribution of the distinct markets monthly returns have been computed and graphically displayed in the scatter plot below (Diagram 10 & 11). A negative skewness can be observed in both markets; however, it is more negative within the developed markets. The negative skewness indicates a higher probability of obtaining more negative returns than predicted by the standard normal distribution. In terms of kurtosis, both markets have a positive excess kurtosis (Table 10 & 11), which implies that both market returns follow a leptokurtic distribution. Accordingly, both markets are likely to generate higher extreme values than accounted for in the normal distribution. However, by comparing the two graphs, it is visible that the normal distribution does not capture the returns of the developed market as well as for the emerging ones. This can be explained by the higher excess kurtosis and a more negative skew found in the developed markets' monthly returns. Consequently, the developed countries' standard deviation is more likely to underestimate risk in the "traditional" risk measurements.

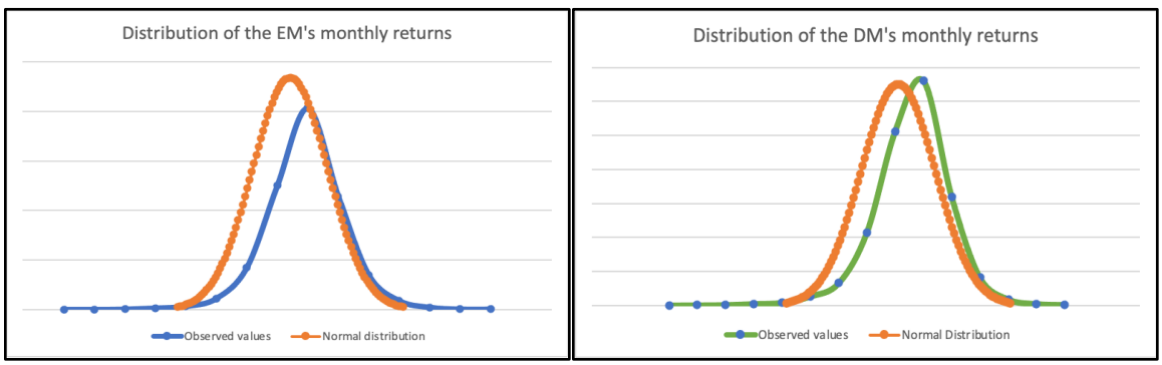

Diagram 10 & 11. Scatter plot displaying the distribution of the returns within emerging markets and developed markets.

Similarly, the skewness and kurtosis have been calculated for every constructed portfolio. The results are displayed in Table 12. Every portfolio's returns deviated from the normal distribution by having a negative skewness and a positive excess kurtosis. The higher the deviations, the more deceptive the standard risk measure results arguably are. Portfolio A has the most negative skewness and Portfolio C has the highest excess kurtosis. Conclusively, the U.S. Reflective Portfolio, which consists of roughly 96% developed markets' equities, exhibits the most negative skew out of all seven portfolios. Contrary, the optimized Portfolio C, which contains roughly 56% emerging markets, exhibits the highest excess kurtosis of all. However, it is essential to look at the values together. Rational investors should reasonably prefer a positively skewed portfolio with a positive excess kurtosis. This scenario indicates a portfolio with a higher frequency of positive returns and positive extreme values than predicted by the normal distribution. However, in this case, with only negative skewness, lower kurtosis is more desirable. The reason for this depends on the higher frequency of negative returns and, consequently, a greater likelihood of extreme negative values, which are not desirable.

Deviation from ND	Portfolio A	Portfolio B	Portfolio C	Portfolio D	Portfolio E	Portfolio F	Portfolio G
Skewness	-0,5677	-0,3945	-0,3136	-0,5384	-0,5210	-0,2838	-0,3342
Kurtosis	1,2557	1,1718	1,4804	1,3350	1,1847	1,6111	1,6796

Table 12. Calculated skewness and excess kurtosis for the constructed portfolios.

4.7 Portfolio Performance Summary

Under the circumstance of a perfect beta-value and a perfectly diversified portfolio, the Treynor- and Sharpe ratio would display the same value because the overall risk would then be equal to the systematic risk. However, this is not the case due to the implications of measuring the beta-value precisely and the limitations done in this study. Instead, certain conclusions can be drawn based on the relative difference in the two performance measurements' value. In the cases where the Treynor ratio is high relative to the Sharpe ratio, it can be argued that insufficient diversification has been made in the portfolio; it implies a low presence of systematic risk, a non-diversifiable risk, in relation to the amount of the overall risk in the portfolio, which can be reduced through efficient diversification. This scenario can be observed in portfolio A, C and D, which has the most significant percentage change between the two ratios.

All of which have improved their ranking with beta-value as a risk measure instead of the standard deviation (Diagram 12).

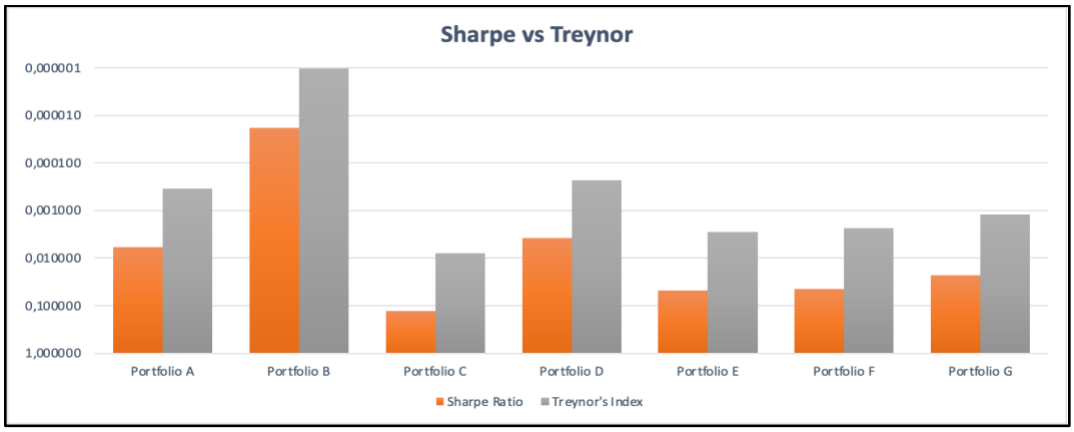

Diagram 12. Sharpe and Treynor ratio displayed on a logarithmic scale with the base of 10.

No portfolio outperforms Portfolio A in every measure. However, 4/6 portfolios are more likely to yield a higher return than the U.S. Reflective Portfolio. All of these have a more extensive weight distribution in emerging markets than the general American's holding. Further, the same portfolios performed preferably in terms of the three performance measures as well. Although, at the expense of higher risk dimensions. On the other hand, Portfolio B and D are expected to yield a lower return than A. However, they contain lower risk factors and have the same predominant allocations toward developed markets (Table 13). Therefore, the investor's risk tolerance is crucial, for which optimal portfolio allocation should be imitated. Although, the general American investor, who already has extensive holdings in the domestic market, is better off tilting her allocations toward specific emerging markets to obtain higher returns and reduced risk exposure.

Deviations from Portfolio A	Portfolio B	Portfolio C	Portfolio D	Portfolio E	Portfolio F	Portfolio G
Expected Return	-0,02%	0,73%	-0,01%	0,18%	0,22%	0,10%
Variance	0,05%	-0,17%	0,03%	0,00%	-0,12%	-0,11%
Standard Deviation	0,62%	-1,69%	0,34%	0,00%	-1,23%	-1,10%
Beta-Value	0,06	-0,26	0,06	-0,02	-0,32	-0,31
Sharpe Ratio	-0,00575	0,12147	-0,00204	0,04284	0,03843	0,01702
Treynor's Index	-0,00035	0,00752	-0,00012	0,00251	0,00203	0,00086
Sortino Ratio	-0,00475	0,09558	-0,00191	0,03282	0,02609	0,01120

Table 13. Comparison of performance between the different portfolios and Portfolio A. Green cells indicate a better value compared to A and red cells the opposite.

All parameters which have been discussed to have an impact on the portfolios' performance are summarized and compiled in a ranking system in Table 14. The row "Traditional Performance" is based on the portfolio's Sharpe- and Treynor ratio. The

“Additional Risk Measures” is based on the more unconventional risk measures; CVaR, political risk, skewness and kurtosis. From a traditional perspective, Portfolio C received the highest ranking. However, when accounting for the additional risk measures, Portfolio C drops a position. Other portfolios that have been downgraded are Portfolio F and G. Additionally, G is the worst performing portfolio overall. Thus, a common trait for the portfolios which have dropped or remained in the same rank is that they have a predominant distribution in emerging markets. Conversely, all the portfolios that have improved their ranking have a majority allocation towards developed markets.

Ranking based on:	Portfolio A	Portfolio B	Portfolio C	Portfolio D	Portfolio E	Portfolio F	Portfolio G	Average
Traditional Performance Measures	6	2	14	4	12	10	8	8
Additional Risk Measures	19	20	13	19	18	14	10	16
Overall	25	22	27	23	30	24	18	24

Table 14. Ranking of the overall performance. The best performance in each category is assigned seven points and the worst is assigned one point.

5. Discussion of Limitations

Optimally, this study would include a broader spectrum of countries over a more extended period of time. However, this thesis is limited to 46 countries throughout 2000-2019. The reason for this is to maintain the perspective of comparing emerging- and developed markets. However, the examined countries constitute over 98% of the total world market capitalization (Appendix C). The same countries also cover up to 86% of the total foreign investments done by American non-resident households. Accordingly, this limitation is assumed to have a small impact on the overall result. Further, the country indices used in this study capture 85% of the specific country’s equity-sphere and is thus not a complete reflective proxy. Regarding the limitations mentioned above, the results provided in this thesis may not be fully generalizable. Moreover, the examined time period limits this study and its results. However, 2000-2019 is recent history and includes booms and busts, financial crisis and recessions, and subsequent recovery phases. This period could thus be argued to be up-to-date and of interest for research.

This study examines historical data of price fluctuations, thereby presenting optimal portfolio strategies for the examined time. Thus, the findings presented here cannot be assumed to hold true with future prices and portfolio selection strategies.

Furthermore, this thesis functions under the assumption that the investment occurs at the beginning of the time frame examined and that the portfolio weights are fixed. Thus, the portfolios are thereby not re-balanced during the investigated time frame, which is derived from the assumption that investors are constant in their allocation of weights during the examined time frame in this thesis. Compared to financial institutions, general American households can be assumed to be more passive in managing portfolio holdings. Therefore, the usage of the long-term investment perspective with constant allocations throughout the whole time frame can be argued to be more reasonable.

Furthermore, short positions, or negative holdings, were not allowed in the construction of the portfolios in this study. This limitation was set because some of the countries examined did not allow for short sales during this thesis's time period. Additionally, short selling on foreign markets is more burdensome than in domestic markets and involves additional costs. However, if it were to be allowed in this study, the allocations for each portfolio would likely be significantly different.

6. Conclusions

Conclusively, this study finds that the general U.S. investor as of 2019 weighs approximately 80% of her holdings domestically. Thus, exhibiting a strong home-country bias since the U.S. capital market only accounts for 43% of the whole world. Additionally, in the remaining 20% slot, the same investor disperses 83% in other developed markets and a mere 17% in emerging markets. Thus, information on expected returns, amount of variety and correlation does not appear to be the basis for the general American investor's decision-making. The potential reasoning for this bias is found to include the contingent risks of international diversification, such as political stability- and exchange rate risk. Further, the high average transaction costs in emerging markets and the information asymmetry between investors' knowledge of foreign and domestic equities appear to play a vital role. Moreover, investors' familiarity and cultural similarities to different investment options have been suggested to impact their preferences. Implying that the average U.S. investor is neglecting the idea of modern portfolio theory and consequently make geographically inefficient allocations in that sense.

This thesis suggests that U.S. investors can improve their risk-adjusted returns by diversifying internationally. According to the traditional performance study results, the highest risk-adjusted returns can be reached by increasing the allocation towards emerging markets. The same applies to minimizing portfolio risk. Hence, both investor profiles can improve their preferable performance measure when keeping the home-country bias and allowing for greater holdings in emerging markets. However, when accounting for risk measures not included in the modern portfolio theory, the advantages of emerging markets are challenged.

6.1 Proposal for Further Research

In this thesis, broad national country indices have been used to reflect the general development of the individual country's capital markets. However, in order to illustrate the effects of international diversification better, it would be wise to let the country indices be limited to a single sector level, for instance, by targeting the industrial industry and using equivalents to the Dow Jones Industry Index for every country. By doing so, the effects of international diversification would likely elevate as the domestic industrial diversification would be reduced. However, the coverage over each country's capital market would be significantly lower.

Although a big part of this thesis covers a behavioral finance aspect, this study's overlying research methodology follows a quantitative nature. Larger amounts of data have been gathered and analyzed in order to reach conclusions. The phenomenon of "home-country bias" is hard to rationalize/explain with numbers. Therefore, using a qualitative approach in that segment would perhaps bring a more insightful perspective of why the general Americans behave in specific ways when investing. This could be examined through surveys or interviews with Americans who invest in the capital market. By doing so, a more comprehensive understanding could be reached.

Another suggestion would be to reconstruct the portfolios each year. This would bring a more insightful view of how the benefits from geographical allocation would vary throughout the years due to the slowly increasing correlation. By doing so, one could observe how the allocation towards the U.S. is affected as the correlation with the other markets are shifting. Further, one factor that speaks in favor of reconstructing

the portfolios yearly is the Sharpe ratio's ability to capture short term movements. A country's returns may vary significantly from one year to another but stay relatively stable over the long term. Consequently, the portfolios constructed by maximizing the Sharpe ratio are less geographically diversified due to this thesis's long-term perspective.

7. References

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8. Appendix

Appendix A

Correlation	CHI	IND	INDO	KOR	MAL	PAK	PHI	TAI	THA	CZE	EGY	GRE	HUN	POL	RUS	SOU	TUR	ARG	BRA	CHI	COL	MEX	PER	USA	AT	BEL	CAN	DEN	FIN	FRA	GER	HK	IRE	ISR	ITA	JAP	NET	NEW	NOR	POR	SIN	SPA	SWE	SWI	UK	AUS
CHI	1																																													
IND	0,5652	1																																												
INDO	0,4215	0,5835	1																																											
KOR	0,6776	0,6005	0,5562	1																																										
MAL	0,4692	0,5428	0,5447	0,5244	1																																									
PAK	0,1548	0,2284	0,1026	0,2375	0,1624	1																																								
PHI	0,4390	0,5695	0,5708	0,4943	0,4454	0,1350	1																																							
TAI	0,6081	0,5521	0,4367	0,7336	0,5778	0,2447	0,4299	1																																						
THA	0,5362	0,5588	0,5943	0,6341	0,4906	0,1885	0,5866	0,5863	1																																					
CZE	0,4913	0,4700	0,4412	0,5466	0,4829	0,3119	0,3029	0,4763	0,3936	1																																				
EGY	0,3703	0,4688	0,4461	0,4486	0,3639	0,1925	0,4233	0,3696	0,4007	0,4256	1																																			
GRE	0,4462	0,4771	0,3199	0,4859	0,4191	0,2494	0,3147	0,4293	0,3180	0,5699	0,3773	1																																		
HUN	0,5352	0,5514	0,4585	0,5690	0,5178	0,2962	0,3928	0,4982	0,4156	0,7356	0,4140	0,6092	1																																	
POL	0,5272	0,5839	0,4348	0,6349	0,5028	0,3397	0,4402	0,5433	0,4520	0,7325	0,4170	0,5946	0,7736	1																																
RUS	0,5073	0,4283	0,4262	0,5804	0,4357	0,2946	0,2935	0,5561	0,5120	0,5753	0,3275	0,4448	0,6162	0,5390	1																															
SOU	0,6551	0,6295	0,5369	0,6516	0,4865	0,2352	0,4437	0,5181	0,5924	0,6119	0,4290	0,4667	0,6187	0,6799	0,5862	1																														
TUR	0,5198	0,4663	0,3666	0,5458	0,4035	0,2201	0,3571	0,4398	0,4439	0,4938	0,3455	0,4073	0,5249	0,5071	0,4702	0,5211	1																													
ARG	0,3672	0,3407	0,3102	0,3693	0,3472	0,1463	0,2549	0,3923	0,3536	0,4038	0,2310	0,3348	0,3707	0,4092	0,3985	0,4064	0,4107	1																												
BRA	0,5975	0,5591	0,4146	0,5699	0,5246	0,3228	0,3860	0,5447	0,5300	0,5515	0,3891	0,4744	0,5991	0,6162	0,6090	0,6816	0,5069	0,4937	1																											
CHI	0,5364	0,5377	0,4674	0,5742	0,5424	0,1494	0,4645	0,5340	0,5434	0,4873	0,3644	0,4388	0,5392	0,5585	0,5031	0,6031	0,5199	0,4697	0,6510	1																										
COL	0,5004	0,4579	0,4938	0,5180	0,4994	0,1817	0,4074	0,4478	0,4787	0,4641	0,4138	0,4417	0,4977	0,4666	0,4880	0,5609	0,4432	0,3163	0,5028	0,5196	1																									
MEX	0,5139	0,5970	0,5389	0,6559	0,5586	0,2501	0,4662	0,5805	0,5141	0,5704	0,4108	0,4932	0,6463	0,6744	0,6320	0,6461	0,5215	0,4663	0,6474	0,6205	0,5559	1																								
PER	0,5371	0,4997	0,4719	0,5059	0,4710	0,2014	0,3509	0,4836	0,5493	0,4770	0,3620	0,3419	0,4844	0,4793	0,5050	0,6319	0,3339	0,3816	0,6331	0,4839	0,4526	0,5770	1																							
USA	0,6267	0,5374	0,4369	0,6877	0,4624	0,2215	0,4474	0,6155	0,5194	0,5106	0,3349	0,5444	0,5930	0,6228	0,5878	0,5993	0,5249	0,3625	0,5884	0,5430	0,4262	0,7034	0,4211	1																						
AT	0,5817	0,5540	0,4897	0,5856	0,5106	0,2511	0,4059	0,5429	0,4664	0,6350	0,4358	0,6921	0,7248	0,6453	0,6056	0,6671	0,3818	0,4333	0,6210	0,5437	0,5168	0,6341	0,5145	0,6633	1																					
BEL	0,5493	0,5475	0,5237	0,5736	0,5066	0,1791	0,4469	0,5435	0,4998	0,5528	0,4037	0,5789	0,6085	0,5885	0,4878	0,6185	0,4407	0,3815	0,5796	0,5893	0,4825	0,6107	0,4647	0,7204	0,7723	1																				
CAN	0,6773	0,6074	0,4958	0,6600	0,4894	0,2307	0,4228	0,5892	0,5715	0,6025	0,3837	0,5250	0,6265	0,6213	0,7007	0,7049	0,5035	0,4271	0,7194	0,5946	0,4971	0,7087	0,6276	0,7887	0,6932	0,6487	1																			
DEN	0,5487	0,5583	0,4872	0,5736	0,5046	0,1903	0,4325	0,5491	0,4944	0,6052	0,4397	0,5606	0,6570	0,6325	0,5636	0,5837	0,3864	0,3916	0,5669	0,5503	0,4063	0,5920	0,3774	0,7139	0,7092	0,7439	0,6938	1																		
FIN	0,4759	0,4631	0,2375	0,5376	0,3290	0,2322	0,2405	0,4249	0,2775	0,5101	0,3310	0,4922	0,5467	0,6120	0,4517	0,4868	0,5306	0,3477	0,4800	0,4222	0,2959	0,5387	0,2902	0,6781	0,5112	0,5605	0,5766	0,5969	1																	
FRA	0,5978	0,5827	0,4278	0,6456	0,5171	0,2372	0,3883	0,5883	0,4689	0,6557	0,4102	0,6907	0,7139	0,7388	0,5705	0,6495	0,5183	0,4328	0,6340	0,5769	0,4460	0,6874	0,4635	0,8141	0,7917	0,8224	0,7392	0,7787	0,7462	1																
GER	0,6087	0,6100	0,4724	0,6833	0,5557	0,2404	0,4214	0,6123	0,4899	0,6272	0,4062	0,6492	0,6818	0,7202	0,5492	0,6372	0,5435	0,4274	0,6417	0,5732	0,4493	0,7067	0,4665	0,8240	0,7406	0,7811	0,7104	0,7569	0,6989	0,9382	1															
HK	0,7580	0,6882	0,5296	0,6693	0,6052	0,2036	0,4860	0,6628	0,5270	0,5498	0,3885	0,5180	0,5977	0,6140	0,5662	0,6579	0,5057	0,3969	0,6167	0,6015	0,5328	0,6130	0,4990	0,6620	0,6173	0,6245	0,7133	0,6232	0,5263	0,6685	0,6782	1														
IRE	0,4170	0,3790	0,3796	0,5148	0,3616	0,1890	0,3084	0,5013	0,3839	0,4912	0,3312	0,5304	0,4956	0,5126	0,4719	0,4635	0,3185	0,3188	0,4557	0,4177	0,3601	0,5178	0,2999	0,7167	0,6743	0,6988	0,5786	0,6705	0,5294	0,7148	0,7043	0,4726	1													
ISR	0,3903	0,4460	0,3055	0,4296	0,3232	0,2027	0,3228	0,3817	0,2825	0,4075	0,2544	0,3841	0,3982	0,4074	0,3274	0,4034	0,4167	0,3241	0,3868	0,3763	0,2412	0,4781	0,2676	0,5810	0,3796	0,4259	0,5702	0,5160	0,4966	0,5395	0,5749	0,5169	0,3906	1												
ITA	0,5088	0,5847	0,4192	0,5608	0,4991	0,2186	0,3247	0,5029	0,4136	0,6277	0,4055	0,6958	0,6873	0,6814	0,5057	0,5742	0,4821	0,4078	0,5548	0,5149	0,4286	0,6441	0,4114	0,6885	0,7668	0,7470	0,6534	0,7136	0,6590	0,9076	0,8437	0,5966	0,6423	0,4647	1											
JAP	0,5269	0,5291	0,4201	0,5779	0,3437	0,1370	0,3213	0,4549	0,5127	0,3985	0,4122	0,4539	0,4790	0,4775	0,5195	0,6037	0,3996	0,3356	0,4464	0,3994	0,3410	0,5282	0,3824	0,6174	0,5901	0,5080	0,5987	0,5620	0,4485	0,5696	0,5583	0,5517	0,4942	0,3768	0,5240	1										
NET	0,6063	0,6213	0,4770	0,6522	0,5355	0,2136	0,4302	0,5996	0,5100	0,5923	0,4019	0,6570	0,6696	0,7058	0,5362	0,6397	0,5089	0,4020	0,6280	0,5765	0,4632	0,6859	0,4557	0,8239	0,7597	0,8561	0,7248	0,7911	0,6856	0,9331	0,8981	0,6765	0,7205	0,5327	0,8510	0,5855	1									
NEW	0,5411	0,5325	0,5247	0,5914	0,4810	0,2438	0,4796	0,5515	0,5504	0,4531	0,4061	0,5358	0,5435	0,5493	0,4466	0,5708	0,4570	0,3388	0,5143	0,4505	0,5183	0,5273	0,4525	0,6130	0,6162	0,5894	0,5876	0,5583	0,4832	0,6038	0,5952	0,6106	0,5130	0,4074	0,5440	0,5245	0,6084	1								
NOR	0,6500	0,5761	0,4855	0,6480	0,5463	0,2363	0,4082	0,6018	0,5363	0,6247	0,4153	0,5774	0,6672	0,6502	0,6493	0,7045	0,4612	0,4205	0,7011	0,6385	0,5223	0,6439	0,5540	0,7053	0,7833	0,7764	0,7842	0,7617	0,5923	0,8094	0,7624	0,6847	0,6366	0,4737	0,7377	0,5598	0,8111	0,5841	1							
POR	0,5101	0,5595	0,3987	0,5121	0,4954	0,1829	0,3611	0,4832	0,4254	0,5904	0,3552	0,6210	0,6388	0,6070	0,4700	0,5649	0,3699	0,3730	0,5783	0,5260	0,4754	0,5797	0,4726	0,5878	0,7123	0,7211	0,5997	0,6941	0,5806	0,8037	0,7422	0,5860	0,5796	0,4262	0,7955	0,4907	0,7589	0,5593	0,6914	1						
SIN	0,6917	0,6590	0,6092	0,6969	0,6194	0,2737	0,5644	0,6466	0,6355	0,4957	0,3977	0,5083	0,5744	0,6162	0,5629	0,6566	0,5456	0,4257	0,6237	0,6039	0,5799	0,6820	0,5637	0,6819	0,6491	0,6537	0,6984	0,5760	0,4750	0,6673	0,6880	0,7904	0,4711	0,4493	0,5984	0,5355	0,6880	0,6533	0,6917	0,5322	1					
SPA	0,5299	0,5645	0,4162	0,5932	0,4828	0,2137	0,3768	0,5277	0,4545	0,6676	0,3745	0,7026	0,6839	0,7150	0,5128	0,5967	0,5057	0,4376	0,6072	0,5431	0,4399	0,6596	0,4357	0,6857	0,7387	0,7337	0,6402	0,6859	0,6185	0,8804	0,8293	0,6021	0,6333	0,4472	0,8794	0,5370	0,8298	0,5471	0,7048	0,7959	0,5892	1				
SWE	0,6070	0,6012	0,4437	0,6711	0,5340	0,2537	0,4192	0,6135	0,4805	0,6018	0,3882	0,5546	0,6467	0,6949	0,5410	0,6249	0,5738	0,4271	0,6053	0,5919	0,4404	0,6918	0,4490	0,7859	0,6509	0,7140	0,7144	0,7696	0,7160	0,8633	0,8638	0,7020	0,6415	0,6319	0,7614	0,5324	0,8359	0,6018	0,7487	0,6790	0,6650	0,7537	1			
SWI	0,5557	0,5232	0,4889	0,5964	0,4586	0,1654	0,4463	0,5038	0,4883	0,5858	0,4137	0,6072	0,6267	0,6739	0,5057	0,6085	0,4059	0,3482	0,5562	0,5198	0,4495	0,6049	0,4240	0,7425	0,7254	0,7718	0,6454	0,7279	0,6128	0,8406	0,8062	0,6259	0,6335	0,4766	0,7517	0,5910	0,8287	0,6240	0,7146	0,6898	0,6089	0,7275	0,7322	1		
UK	0,6509	0,5489	0,4635	0,6315	0,5267	0,3096	0,4287	0,5625	0,5216	0,6260	0,4109	0,6616	0,6884	0,6824	0,6430	0,6665	0,5343	0,4373	0,6516	0,6187	0,5113	0,6661	0,4803	0,8259	0,7873	0,8094	0,7883	0,7670	0,6696	0,8840	0,8396	0,7224	0,7371	0,4948	0,8031	0,6096	0,8569	0,6294	0,8480	0,7210	0,7200	0,7888	0,7835	0,8131	1	
AUS	0,6943	0,6487	0,5708	0,7156	0,5341	0,2536	0,5105	0,6042	0,6193	0,6061	0,4505	0,6042	0,6668	0,6870	0,5989	0,7611	0,5313	0,4222	0,7009	0,6053	0,5068	0,6926	0,6026	0,7381	0,7387	0,6939	0,7736	0,6636	0,6121	0,7649	0,7404	0,7159	0,6256	0,5325	0,6919	0,6053	0,7495	0,7533	0,7866	0,6424	0,7488	0,6962	0,7282	0,7230	0,7855	1

Appendix B

GDP Current US$	2000	2019	Procentual growth GDP 2000-2019
Canada	742	1736	134%
United States	10252	21374	108%
Austria	197	446	127%
Belgium	236	530	124%
Denmark	164	348	112%
Finland	126	269	114%
France	1362	2716	99%
Germany	1943	3846	98%
Ireland	100	389	289%
Israel	132	395	199%
Italy	1144	2001	75%
Japan	4888	5082	4%
Netherlands	416	909	118%
New Zealand	53	207	293%
Norway	171	403	136%
Portugal	118	238	101%
Spain	597	1394	134%
Switzerland	272	703	158%
Sweden	263	531	102%
United Kingdom	1658	2827	71%
Australia	415	1393	235%
Hong Kong SAR, China	172	366	113%
Singapore	96	372	287%
Developed markets avg.	**1109**	**2108**	**141%**
Argentina	284	450	58%
Brazil	655	1840	181%
China	1211	14343	1084%
Chile	78	282	263%
Colombia	100	324	224%
Czech Republic	62	246	300%
Egypt, Arab Rep.	100	303	204%
Greece	130	210	61%
Hungary	47	161	241%
India	468	2875	514%
Indonesia	165	1119	578%
Korea, Rep.	576	1642	185%
Malaysia	94	365	289%
Mexico	708	1258	78%
Pakistan	82	278	239%
Philippines	84	377	350%
Poland	172	592	245%
Peru	52	227	338%
Russian Federation	260	1700	555%
South Africa	136	351	158%
Thailand	126	544	330%
Turkey	273	754	176%
Emerging markets avg.	**267**	**1375**	**302%**

Appendix C

Market capitalization of listed domestic companies (current US$)	2003 [YR2003]
Canada	9,10231E+11
United States	1,42663E+13
Austria	56522450000
Belgium	1,73553E+11
Denmark	1,21641E+11
Finland	1,70292E+11
France	1,35593E+12
Germany	1,07903E+12
Ireland	85070380000
Israel	70169060000
Italy	6,14842E+11
Netherlands	4,88647E+11
Norway	95919910000
Portugal	58284740000
Sweden	2,89877E+11
Spain	7,26243E+11
Switzerland	7,27103E+11
United Kingdom	2,42582E+12
Australia	5,8553E+11
Hong Kong SAR, China	7,14597E+11
Japan	2,9531E+12
New Zealand	33049760000
Singapore	1,48503E+11
Argentina	34994620000
Brazil	2,3456E+11
Chile	86525910000
Colombia	14252784000
Mexico	1,22533E+11
Peru	14125030000
Czech Republic	15507730000
Egypt, Arab Rep.	27070000000
Greece	1,06644E+11
Hungary	16662910000
Poland	37020270000
Russian Federation	2,3077E+11
South Africa	2,60748E+11
Turkey	68379000000
China	5,12979E+11
India	2,79093E+11
Indonesia	54659060000
Korea, Rep.	3,29457E+11
Malaysia	1,60814E+11
Philippines	23175720000
Pakistan	16629330000
Thailand	1,19017E+11
Sum	3,09158E+13
World	3,13E+13
Coverage	**98,77%**

Appendix D

Developed Markets	Emerging Markets
Canada	Argentina
United States	Brazil
Austria	Chile
Belgium	Colombia
Denmark	Mexico
Finland	Peru
France	Czech Republic
Germany	Egypt, Arab Rep.
Ireland	Greece
Israel	Hungary
Italy	Poland
Netherlands	Russian Federation
Norway	South Africa
Portugal	Turkey
Sweden	China
Spain	India
Switzerland	Indonesia
United Kingdom	Korea, Rep.
Australia	Malaysia
Hong Kong SAR, China	Philippines
Japan	Pakistan
New Zealand	Thailand
Singapore	Taiwan