Domestic international portfolio diversification gains in the case of US investors

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ABSTRACT

We assess through this study, the advantages of domestic international portfolio diversification for American investors, through the holding of securities relating to foreign funds traded on the American capital market. We concluded that these home investors derive benefits from their indirect international diversification by saving all the trading and transaction costs of direct international diversification in the financial markets of home countries. However, these benefits derived remain dependent on the degree of exposure of the securities held to the risks of the US stock market. On the other hand, it seems that the economic cycle and the American stock market indices have no influence on the returns of these foreign securities. On the contrary, these foreign securities follow their underlying country indices (country index) and are subject to financial disturbances of their financial markets and their home countries’ economic cycles.

Keywords: International home diversification, financial markets, foreign exchange traded funds, GARCH, volatility, DCC, MVS Test.

INTRODUCTION

Financial markets modern theories consider internationally diversified portfolios to be of lower risk than purely domestic portfolios. Indeed within a country, diversification benefits are limited, since industrial sectors and returns on capital are jointly impacted by the vagaries of the same economic cycle. It turns out that the significant benefits of diversification come from capital that is placed in countries that have weak economic cycles, or that are no longer correlated. In a country, the risk which is systematic for a locally diversified portfolio becomes an unsystematic risk for an internationally diversified portfolio. However, investors acquire a capacity to purchase foreign funds dependent on the level of integration and segmentation of national financial markets. Thus, because of these two characteristics of the markets, we often observe differences in comparable returns on capital between countries, which are the consequence of adjustments to currency risk and political risk. Market imperfections can also be the result of countries’ fiscal policies, restrictions on foreign currencies, regulatory oversight that affects financial markets, information asymmetry and liquidity lack. For example, investors in the United States show a preference for domestic investments, as they perceive more convenience and familiarity with American stocks compared to foreign markets. In this perspective, US investors are achieving their international diversification objectives through securities representing foreign assets that are locally available. These securities can be shares of diversified multinationals, such as MNCs (multinational companies), international mutual funds such as ADRs (American Depositary Receipts). In order to derive the best benefits from international diversification, these investors have also implemented international diversification strategies through geographic allocation by country and by sector. From the 1990s, American investors had a new financial tool enabling them to indirectly invest on an international scale. Known as WEB\(^1\) and, currently, known as “iShares”, this security is an exchange traded fund designed to track

\(^1\) World Equity Benchmark Share
certain local country indices’ performance. This fund provides investors with a portfolio enabling them to achieve a performance comparable to that of a benchmark home index (country index) and combining the diversification advantages offered by a traditional stock market index as well as the transactions flexibility of ordinary stock.

The iShares give the advantage to the investor to realize all international diversification strategies (by multinationals, by country, by geographic region or by industrial sector). This fund simultaneously reflects the underlying index risk (origin country, sector, multinationals) and host country risk (US market). Zhong and Yang (2005) indicate that iShares are determined by the cash flows (fundamental component) of the international securities that make up their underlying indices, and by the specific US risk (non-fundamental component), to the extent that they are traded in the US market. In this sense, indirect international diversification is considered effective if these foreign assets have limited exposures to changes in the US market with a strong correlation to the countries’ local stock indexes. It is in this sense of idea that we aim, through this study, to analyze the benefits of such indirect diversification for the case of American investors. The ultimate goal of this study is to answer the following research questions:

1. Is indirect (home) international diversification beneficial for Americans investor?
2. Are foreign exchange traded funds “iShares” an effective instrument of indirect diversification for American investors’ benefit?

To meet these objectives, the study is organized as follows:

In the first part, we present a literature review then the empirical methodology. We pool, through an empirical model, three strategies (by country, by multinationals and by sector) in order to verify whether American investors derive benefits from home international diversification, by buying foreign funds traded on US financial markets. In a second part, we analyze the dynamics volatility of foreign funds (iShares) traded on US stock market, by using GARCH model. In a third part, we analyze the Dynamic Conditional Correlation (DCC) between foreign funds traded on US stock market (iShares) and US stock index (Russell1000). In a fourth part, we analyze the Dynamic Conditional Correlation between the iShares and the main stock market index relating to each country originating from foreign fund (iShares). Afterwards and by using Mean Variance Spanning (MVS) test, we assess the indirect home diversification opportunities for US investors.

**LITERATURE REVIEW**

One of the simplest investment methods is the international indirect fund, because direct investment requires a perfect knowledge of the functioning of the markets as well as an interpretation of somewhat complex information. In addition, these alternative investments are diversified, depending on whether there is a bull or a bear market. Identifying these periods is essential for investor decision making. ETFs \(^2\) can be defined as open-ended, exchange-traded investment funds that aim to achieve a certain level of performance relative to a benchmark. ETFs are passive investment vehicles, which have become increasingly popular over a short period (Blitz and Huij, 2012). Like individual stocks, ETFs are traded in real time at a price determined by supply and demand (Madhavan, 2012). The first ETFs appeared in Canada in 1990, in the Toronto 35 Index Participation Fund (TIP), and since then the demand for ETFs has increased dramatically, becoming a topic of interest to researchers. In the context of international portfolio diversification, a large number of empirical studies have also addressed its advantages and disadvantages. Indeed, some authors consider that the correlation between domestic markets makes diversification less effective. Coeurdacier et al. (2011) report that investors actively rebalance their portfolios in favor of countries that offers greater diversification potential. In addition, some authors argue that co-movements between markets can change over time and vary in frequency (Ang and Chen, 2002; Ruas and Nunes, 2009). While these correlations vary over time, they can also change significantly in times of financial crisis, primarily affecting investment decisions. For example, Forbes and Rigobon (1999), Ratanakorn and Sharma (2002), Leong and Felmingham (2003) and (2009) show that correlations between markets increase during volatile business cycles.

Furthermore, Ahmed (2017) suggests that during financial crises, herd behavior is present in almost all sectors of the US stock market, as investors wish to copy presumably well-informed traders. Also, Beine et al. (2010) find that trade and financial integration has increased the likelihood that international stock markets will collapse jointly, justifying the challenge of diversification during a stock market crash. According to several authors, the benefits of international diversification have diminished over time, as the correlation in both developed markets (DM) and emerging markets (EM) has increased markedly (Bekaert et al., 2009; Chiu, 2008; Christoffersen et al., 2012). In this context, although the iShares have been marketed as a vehicle for indirect international diversification, the question of whether securities listed on the US stock exchanges really constitute an effective method of diversification is important. The iShares have been the subject of much debate (Shin and Soydemir, 2010). So, despite the advantages of using iShares over domestic stock indices, only a few studies have used iShares as a proxy for foreign stock markets. The results obtained

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\(^2\) Exchange-traded fund
are either mixed or inconsistent. By studying the construction of optimal portfolios, Swanson (2004) and Miffre (2007) find that iShares, by containing sufficient information, can enhance the benefits of diversification. Published academic literature has highlighted some of the benefits of international portfolio diversification through indirect investment (Rowland et al., 2004). It has been suggested that investors benefit from using indirect methods to build internationally diversified portfolios and that the benefits of diversification were the same before and after the subprime crisis (Huang and Lin, 2011). Against this background, Pennathur et al. (2002) investigated the diversification benefits of iShares by applying one- and two-factor asset valuation models to iShares prices for the period 1996-1999. They claim that the low diversification potential of iShares could be related to the fact that their behavior is similar to that of the US market. They show that the performance of the iShares over the considered sampling period is greater than that of the corresponding CCFs. Rompotis (2011) reveals that the majority of the 50 iShares for the period 2002-2007 outperform the market, using the S&P 500 index as a proxy for benchmark returns.

Harper et al. (2006) assess the risk-adjusted price performance of products and iShares and empirically show that passive investment strategies using iShares have higher risk-adjusted performance than CCFs. Phengpis et al., (2009) confirm that country ETFs are more exposed to movements of their underlying national indices than to US market indices, and for this reason they offer opportunities for international diversification to US investors. Tse and Martinez (2007) analyze the price discovery process and information transmission of twenty-four international iShares funds, concluding that these new financial products have limited diversification benefits. Their results show that the prices of iShares are strongly correlated with those of American iShares. Likewise, Zhong and Yang (2005) suggest that iShares may not provide significant diversification gains because their movements are more closely linked to the US market than to foreign markets. Similarly, Barari et al. (2008) also show that iShares are not perfect diversification products. Regarding the profitability of iShares, Blitz et al. (2012) empirically show that European index funds and ETFs maintain performance significantly below their benchmark, suggesting that these results could be influenced not only by the cost of funds, but also by taxes on dividends. Thus, this study allows assess, from the point of view of an international investor, the profits and the diversification performances of twenty-two iShares funds.

METHODOLOGY, DATA AND SAMPLE

Methodology

We study empirically, through a mixed international diversification strategy that combines securities relating to multinationals and industrial sectors of countries. We introduce into our approach a local stock market index for each country, in order to verify the existence of any correlation with the relative country iShare, and an American stock index in order to detect whether the US market has an effect on the returns of these countriesiShares. Our aim is to assess whether American investors are reaping the benefits of their indirect international diversifications. Indeed, the iShares follow international indices, deriving potential diversification benefits. However, they can remain highly correlated with the US market due to a few shortcomings related to tracking errors, transaction costs, various operational fees or international arbitration limits. These shortcomings can deflect the returns of iShares from their underlying country indices and therefore, they lose some of the sought-after gains from international diversification. Our empirical approach is based on the regression of a static panel model, estimating a fixed effects model and a random effects model. The arbitration in the choice of the appropriate model is made by the Hausman test ticket. This model describes the effects of the different variables of the model on the evolution of funds traded in the US market. In a second phase of our analysis, we study the volatility of foreign funds traded on the American market, based on the estimation of a GARCH DCC model making it possible to capture the dynamic relationships between these funds and the various diversification strategies home made available to US investors. In a third phase, and through a DCC GARCH model, we analyze the dynamic conditional correlation between foreign funds traded on the US market (iShares) and a stock index tracking the evolution of the US stock market. The objective is to detect the degree of dependence of funds traded in the US market on fluctuations in the US stock market. In the context of our analysis, we also assess the dynamic conditional correlation between funds traded in the US market (iShares) and a stock index of its relative country, based on a DCC GARCH model. This is able to detect the dynamic links between these funds and their stock indexes of the country of origin. Finally, we opt for the use of the Mean Variance Spanning Test (MVS) by Huberman and Kandel (1987), which measures the various opportunities for indirect diversification at home for the American investor.

Data and sample

The statistical data used in our study are weekly data relating to 8 countries for the period from January 2000 to December 2014. The countries in our study sample are: France, Canada, Great Britain, Sweden, Spain, South Korea, South Africa and the Philippines.

Empirical model and variables choice

Regarding the countries chosen, we have selected 8 iShares
countries which are traded on the US financial markets. Also, we used an American stock index, namely, the Russell 1000 index, as a proxy to check if the American market affects the iShares countries. In the model, we introduced a local stock market index for each country as a proxy to track the development of the local financial markets of the sample countries. Thanks to this index, we check if the iShares countries are correlated with their local stock market indices. To highlight the effectiveness of home-based international diversification strategies, we use two indices, namely, the "MNCs" index as a proxy for the strategy of the American investor by purchasing the securities of multinationals and the "industry" index as a proxy for the strategy of the American investor by purchasing sector securities from the countries in the sample. The equation of the static panel model is written as follows:

\[
\text{iShares}_{it} = \alpha_1 \text{MNCs}_{it} + \alpha_2 \text{Industry}_{it} + \alpha_3 \text{Russell1000}_{it} + \epsilon_{it} \tag{1}
\]

With,

\text{iShares}_{it}: Funds traded on the US market in country i to t which represents our dependent or explainable variable.

\text{MNCs}_{it}: These are funds relating to shares of foreign multinationals traded on the US market of country i to t. It is a proxy variable of the effect of US investor strategy by multinationals on iShares countries. In order for the American investor to take advantage of international diversification at home through the purchase of shares of foreign multinationals traded on the American market, this variable must have a positive and significant effect on the iShares countries.

\text{Russell1000}_{it}: This variable is a proxy for the US financial market. For the US investor to benefit from international home diversification, this variable should not have a significant impact on iShares countries.

\text{Industry}_{it}: This variable represents in the model a proxy for the local financial market of country i to t. As much as this variable positively and significantly affects their relative iShares, so much as the US investor benefits from international home diversification.

\text{Index}_{it}: This variable represents a proxy variable of the effect of US investor strategy mixte (iShares pays). Un effet positif significatif de cette variable sur les iShares pays implique que l'investisseur américain tire avantage de sa diversification internationale à domicile par secteur.

\epsilon_{it}: Represents a model error term.

RESULTS AND INTERPRETATIONS

Descriptive statistics, stationarity and variables correlation analysis

Descriptive statistics

Descriptive statistics provide important information on the average, maximum and minimum values of variables (Table 1). Also, thanks to the Skewness and Kurtosis coefficients, we can build an idea on the nature of distributions of the data series. We observe that the weekly average yield of the "iShares countries" is very low, fluctuating within a range of -0.89 to 1.07. The Skewness coefficient is negative and close to zero, implying a slightly skewed left distribution (left spread of the data distribution). Pearson’s Kurtosis indicates the level of flattening or pointicity of the
Table 2: Variables' matrix correlation

<table>
<thead>
<tr>
<th></th>
<th>Ishares</th>
<th>MNCS</th>
<th>Index_C</th>
<th>Russell1000</th>
<th>Industries</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ishares</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MNCS</td>
<td>0.0736</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Index_C</td>
<td>0.2681</td>
<td>0.0448</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russell1000</td>
<td>0.0074</td>
<td>0.0491</td>
<td>0.0004</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Industries</td>
<td>0.8127</td>
<td>0.1558</td>
<td>0.2788</td>
<td>0.0100</td>
<td>1</td>
</tr>
</tbody>
</table>

Source: Author

Table 3: Random effects method's regression

<table>
<thead>
<tr>
<th>Regression</th>
<th>Coefficient</th>
<th>Z</th>
<th>Prob. (z)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constante</td>
<td>0.00012</td>
<td>0.413</td>
<td>0.67</td>
</tr>
<tr>
<td>MNCs_country</td>
<td>-0.031</td>
<td>-7.34</td>
<td>0.00*</td>
</tr>
<tr>
<td>Index_country</td>
<td>0.017</td>
<td>5.92</td>
<td>0.00*</td>
</tr>
<tr>
<td>Russell1000,USA</td>
<td>7.55</td>
<td>0.27</td>
<td>0.78</td>
</tr>
<tr>
<td>Industries</td>
<td>0.84</td>
<td>104.9</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

F-statistic = 3107.1
Prob> chi2= 0.0000

*: 1% significance **: 5% significance ***: 10% significance

Source: Author

distribution. The higher this indicator, the sharper the distribution is on its average with thick distribution tails. The Kurtosis, of our variable “iShares country” is equal to 112.96, much greater than 3 (Kurtosis of the normal distribution), which implies a leptocurtic distribution of the variable (density at a peak greater than the normal distribution). The variable “MNCs” has a weekly mean value equal to 0.000173, varying within a range of -1.38 to 0.26. Its Skewness coefficient is equal to -6, negative and different from zero, indicating an asymmetric distribution on the right (strong spreading on the right). The Kurtosis coefficient of this variable is equal to 101.65, strongly greater than 3, which imply that its distribution is leptocurtic with a distribution pointed at its mean and a peak greater than the normal distribution. The variable “Country index” varies during the period studied between a minimum value equal to -3.45 and a maximum value equal to 5.54 with a Skewness coefficient equal to 11.88 and a Kurtosis equal to 1504.8. A positive and non-zero Skewness and a Kurtosis greater than 3 imply an asymmetric leptocurtic distribution on the left with a peak greater than the normal distribution. During the period studied, the average value of the variable “Russell1000” is of the order of 2.62, with a minimum value and a maximum value, respectively equal to -6.9 and 6.92. Its Skewness is positive and very close to zero and its Kurtosis is greater than 3, which shows that the distribution of this variable is leptocurtic and almost symmetrical with a peak density greater than the normal distribution. Finally, the "Industry" variable has a negative and low average value for the period studied, varying in a range from -0.72 to 0.56. His Skewness is -1.98, negative and non-zero, and its Kurtosis is around 40> zero. We can then say the distribution of this variable is leptocurtic is asymmetric on the left.

Correlation matrix

The correlation matrix does not reveal a real correlation problem between the variables. However, we observe a high correlation coefficient close to 1 between the iShares variable and the Industries variable. Overall the matrix shows us very weak correlation coefficients (Table 2).

Stationarity analysis

We find, through the IPS stationarity tests, that all the model variables are stationary in level, because the probabilities of the tests are all significant at the minimum critical risk level of 1% (Table 3). This validation of stationarity will make it possible to avoid any possible problem of estimation bias.

Coefficients’ model interpretations

On staticpanel data, we estimate the model by the fixed
effect method and the random effect method. The two regressions are followed by a Hausman test which makes it possible to decide on the choice of the adequate method. The Hausman test confirms the choice of the random effects model, given that its relative probability is equal to 37.69%, greater than the critical threshold of 5%. iShares countries are foreign transferable securities that trade in the US market. These are portfolios available to American investors who replicate stock market indices from their countries of origin (country index). As much as the causality between an iShares country and its underling index is strong, so do American investors benefit from their international home diversification. In our study, we notice that the coefficient of the country index which is equal to 0.017 is very significant (probability equal to 0.00% < at the critical threshold of 5%) and positively affects the iShares country. Indeed, a 1% increase in the yield of the country index contributes to an increase in the yield of the relative iShares of 0.017 points. We then see that the iShares countries follow the underlying country indices (country index). Hence, we can say that these home investors benefit from their indirect international diversification by saving all the trading and transaction fees paid in the case of direct international diversification in local financial markets. However, these benefits derived from indirect international diversification remain dependent on the degree of exposure of the iShares countries held to the risk of the US market. This can be verified from the causality between the iShares countries and the US stock index "Russell1000 USA". It appears from the regression results (Table 4) that the US market index "Russell 1000" has no impact on the returns of the iShares countries held by US investors. Indeed, the causal coefficient is positive and equal to 7.55 and is not significant (probability equal to 78% > 5%).

This implies a priori, that these iShares countries are not exposed to the risk of the American market. This is because US home-based investors effectively reap the benefits of international home-based diversification by minimizing their idiosyncratic risks and saving all fees relating to trading and transaction costs, costs relating to currency risk and political risk, which must be paid by the investor in the event of direct international diversification in the countries' local financial markets. From the point of view of the effectiveness of the strategy of international diversification by holding the securities traded “MNCs” on the American market and relating to foreign multinationals, we note that this strategy has a negative and significant effect on the returns of the iShares countries. Thus, a 1% increase in MNCs contributes to a decrease in yields of iShares countries by 0.031 points. Therefore, American investors do not take advantage of their international diversification at home, by holding securities of foreign multinationals traded in the American market. The second home-based international diversification strategy available to US investors is international diversification through the industrial sector. This strategy seems very advantageous, in the sense that the coefficient of the “Industries” variable is equal to 0.84, positive and highly significant on the returns of iShares countries. Thus, a 1% increase in the “Industries” variable contributes to an increase in the yields of iShares countries by 0.84 points. This result implies that American investors derive a significant advantage through their strategy of international diversification at home by the industrial sector. Finally, we find that home-based international diversification is very beneficial for American investors to the extent that funds from foreign countries traded on the American market are subject to the explanatory power of the financial markets of their home country and that these funds are insulated from the risk of the market and the US economic cycle. Thus, the latter have no explanatory power over these foreign funds held. In strategic terms, we conclude that these American home investors derive its benefits from indirect international diversification, mainly through the purchase of securities of international industrial sectors, while their strategy of diversification through the purchase of securities of foreign multinationals negatively affects the returns on their portfolios.

### Volatility analysis of foreign funds traded on the American financial market

Based on our basic model of equation 1, we opt for the use of a DCC GARCH model in order to capture the dynamic links between the foreign funds traded on the American market and the various indirect international diversification strategies of the American investor. To apply the GARCH DCC model, we use our cross-sectional data, whereby we consider a single individual in the study sample. To achieve our objective we consider a GARCH model (1arch, 1garch). Our model is made up of two equations; a main equation 1 and a variance equation. We regress Model 1 then we plot the residue of this regression which we will interpret the low and high volatilities during the period studied, and use it in the regression of the equation of variance. Indeed, the presence of periods of low volatility and high volatility on the plot of the residual suggests that the error term of the equation of the mean 1 is conditionally heteroscedastic. This result will allow us to represent it by an ARCH and GARCH model. The error term from our model 1 can be written as follows:

\[
\varepsilon_t = \beta_1 + \beta_2 \varepsilon_{t-1} + \beta_3 \varepsilon_{t-1}^2 + \beta_4 \text{MNCs}_{\text{country}_t} + \beta_5 \text{Index}_{\text{country}_t} + \beta_6 \text{Russell1000}_{t} + \beta_7 \text{Industry}_{\text{country}_t} \tag{2}
\]

With:

\(\varepsilon_t\) : The variance of the residual term derived from equation 1. This is the current variance of the volatility of the iShares country variable.
\( \beta_1 \): A constant.

\( \varepsilon_{t-1} \): The variance of the previous period of the volatility of the iShares country variable. It is considered the GARCH term of the model.

\( \varepsilon^2_{t-1} \): The squared residual term of the previous period \( t-1 \) from equation 1. It informs about the volatility of the previous period of the iShares country variable. This is the model's ARCH term.

\( \text{MNCs\_country}, \text{Index\_country}, \text{Russell1000\_USA}, \text{Industries\_country} \) are the exogenous variables that contribute to the volatility of the iShares country variable.

The objective of this study is to model the volatility of foreign funds traded in the US market (iShares countries), by determining the factors that affect this volatility of returns of these funds. We choose weekly data to estimate our GARCH (1,1) model with variables that are stationary in level.

**Model (2) regression and residual term plotting**

The MCO regression of the model (2) makes it possible to draw the residual term the graph in Figure 1. We observe on the blue curve of the graph, series of positive and negative shocks. Thus, a small or large positive shock is always followed by several small or large positive shocks of small amplitude or large amplitude causing low volatility followed regularly from high fluctuations of foreign funds (Country iShares) in the US market by reflecting thus a garch process. The graph of the residual term allows us to introduce a GARCH model of order 1 (Garch (1.1)).

**Analysis of the volatility dynamics of foreign funds traded in the US market:**

The GARCH (1.1) model obtained is of the following form:

\[
\text{GARCH} = C(1) + C(2) \times \text{RESID}(-1)^2 + C(3) \times \text{GARCH}(-1) + C(4) \times \text{MNCs\_country} + C(5) \times \text{INDEX\_country} + C(6) \times \text{RUSSELL1000\_USA} + C(7) \times \text{INDUSTRIES\_country} \quad (3)
\]

The GARCH variable represents the error term or the residue of the main equation. It is the volatility of foreign funds traded on the US market (iShares Country). Assuming that the variable distribution follows a normal law, the results of the regression of the GARCH model are summarized in Table 5. From the estimate of the main equation, we estimated the variance of the residues of this equation as part of a Garch model. Thus, the variance of the residual term expresses the volatility of the Country iShares on the US stock market made available to the US investor. In interpreting the parameters of the equation of the variance of the residues, we observe that the Variable Resid (-1), which represents the residual term delayed square and the arch term of the model, is strongly significant with a positive coefficient equal to 0.69 and a zero probability below the risk level of 5%. Also, the term Garch (Garch (-1)) seems not significant and does not affect the volatility of foreign funds traded on the US market. Its coefficient is negative equal to -0.07 its probability is equal to 15.8% higher than the rate level of 5%. We can conclude that the familiar effect or the internal shock of the error term (residues) is relatively significant, since the term arch is significant while the term Garch is not. With regard to our variables of interest that are the MNCs\_COUNTRY, Index\_Country, Russell1000\_USA and Industries\_Country variables, these variables that are all significantly significant on the volatility of country iShares. Indeed, they negatively affect and significantly the volatility of country iShares.

**Dynamic conditional correlation analysis between foreign funds traded in US market (iShares country) and US market index (Russell1000\_usa)**

The dynamic conditional correlation (DCC) within the
Table 4: Variables' unit root test

<table>
<thead>
<tr>
<th>Variable: iShares_country</th>
<th>Prob. (Level)</th>
<th>Prob. (1stD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>H0: Racine unitaire (racine unitaire commun) Levin, Lin &amp; Chu t</td>
<td>0.00*</td>
<td>0.86</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire individuel) Im, Pesaran and Shin W-stat</td>
<td>0.00*</td>
<td>0.00*</td>
</tr>
<tr>
<td>Variable: MNCs_country</td>
<td>Prob. (Level)</td>
<td>Prob. (1stD)</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire commun) Levin, Lin &amp; Chu t</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire individuel) Im, Pesaran and Shin W-stat</td>
<td>0.00*</td>
<td>0.00*</td>
</tr>
<tr>
<td>Variable: Index_country</td>
<td>Prob. (Level)</td>
<td>Prob. (1stD)</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire commun) Levin, Lin &amp; Chu t</td>
<td>1.00</td>
<td>1.00</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire individuel) Im, Pesaran and Shin W-stat</td>
<td>0.00*</td>
<td>0.00*</td>
</tr>
<tr>
<td>Variable: Russell1000_USA</td>
<td>Prob. (Level)</td>
<td>Prob. (1stD)</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire commun) Levin, Lin &amp; Chu t</td>
<td>0.00*</td>
<td>0.00*</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire individuel) Im, Pesaran and Shin W-stat</td>
<td>0.00*</td>
<td>0.00*</td>
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<tr>
<td>Variable: Industries</td>
<td>Prob. (Level)</td>
<td>Prob. (1stD)</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire commun) Levin, Lin &amp; Chu t</td>
<td>0.00*</td>
<td>0.00*</td>
</tr>
<tr>
<td>H0: Racine unitaire (racine unitaire individuel) Im, Pesaran and Shin W-stat</td>
<td>0.00*</td>
<td>0.00*</td>
</tr>
</tbody>
</table>

* : 1% significance ** : 5% significance *** : 10% significance
Source: Author

Table 5: GARCH model estimate: main equation

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>z-Statistic</th>
<th>Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>C</td>
<td>5.512035</td>
<td>16.86080</td>
<td>0.0000</td>
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<tr>
<td>MNCS_COUNTRY</td>
<td>-0.104393</td>
<td>-24.40321</td>
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<td>INDEX_COUNTRY</td>
<td>-0.002847</td>
<td>-79.42002</td>
<td>0.0000</td>
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<tr>
<td>RUSSELL1000_USA</td>
<td>0.017453</td>
<td>37.35403</td>
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<tr>
<td>INDUSTRIES_COUNTRY</td>
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<td>208.2015</td>
<td>0.0000</td>
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<td>Residual term variance equation</td>
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<tr>
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<td>17.19145</td>
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<tr>
<td>RESID(-1)^2</td>
<td>0.691555</td>
<td>9.392728</td>
<td>0.0000</td>
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| GARCH(-1)          | -0.076271   | -1.411925   | 0.1580|
| MNCS_COUNTRY       | -0.138502   | -4.334907   | 0.0000|
| INDEX_COUNTRY      | -0.000617   | -4.083739   | 0.0000|
| RUSSELL1000_USA   | -0.053818   | -7.127864   | 0.0000|
| INDUSTRIES_COUNTRY| -0.318829   | -10.25815   | 0.0000|

Source: Author
framework of a GARCH model (1.1) makes it possible to trace the link and the dynamic relationship between the volatility of iShares countries and the US market index (Russell1000_usa). The existence of a dynamic correlation between the two variables allows concluding that the foreign funds traded on the American market are dynamically affected by the stock market disturbances of the American market, implying, as well as the American investors not benefiting from the advantages of the home international diversification. Indeed, for this investor to derive the benefits of this diversification, by holding securities of foreign funds in his portfolio, the latter must not be correlated with the stock index of the American market and their returns must not be affected by his stock market disruptions. Estimating a DCC_GARCH model relating the iShares countries held by US investors to the market index (Russell1000_usa) gave us the following dynamic conditional correlation graph in Figure 2.

\[ \text{Figure 2: Dynamic conditional correlation (iShares, Russell1000_usa)} \]
\[ \text{Source: Author} \]

The estimation of a DCC_GARCH model relating the return of iShares countries held by American investors and the market index of the country of origin of foreign funds (country index) provided us with the dynamic conditional correlation graph in Figure 3. The regression of the model and the graph provided show us the existence of a dynamic conditional correlation between the returns of foreign funds traded in the US market held by US investors and their market indices in their home countries. Unlike the Russells1000_usa index, the country of origin market index (country index) must have a strong dynamic conditional correlation with the corresponding iShares, in order to reap the benefits of direct international diversification. In our case study, we observe a strong dynamic correlation between the two indices indicating thus, that the iShares countries follow their underlying country indices, which favors the American home investor to reap the benefits of his indirect international diversification of its portfolio. We can conclude, therefore, that US investors are reaping the benefits of home-based international diversification of their portfolios. However, these advantages are relative insofar as local US stock market disruptions significantly affect the returns of locally traded foreign funds.

\[ \text{Mean variance spanning test (MVS)} \]

Huberman and Kandel (1987) are the first to introduce the concept of spanning which was initially restricted to the concept of "mean-variance framework". This statistical method tests whether the addition of a group of new assets to a group of basic invested assets (Benchmark) can justify
an investment opportunity for an investor wishing to diversify his portfolio, by analyzing the effects of these added assets at the investor's average variance frontier. If the average variance frontier of the Benchmark assets (basic assets) coincides with the average variance frontier of the total assets (Benchmark + added assets), we end up with a “spanning” result, which indicates that the investor is not pulling gain or additional benefit to its gain in Benchmark assets, new invested assets. If on the other hand the mean frontier variance of Benchmark assets is smaller than that of invested assets, this indicates a possible investment opportunity for the investor and shows that the investor should derive benefits from diversification by investing in new additional assets.

We are developing this MVS test for the case of an American investor who holds assets in the Russell1000 American market index and who wishes, in order to diversify his portfolio, to hold foreign funds traded on the American market according to the different diversification strategies international, namely, by country (iShares country), by the purchase of shares of multinationals traded on the American market (MNCS country) or by industrial sector (Industry country). The null hypothesis of an MVS test assumes that:

\[ \beta_0 = 0; \beta_1 = \beta_2 = \beta_3 = 1 \]  

The results of the regression are summarized in Table 6.

**Table 6: Mean variance spanning test**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Coefficient</th>
<th>t-Statistic</th>
<th>Prob.</th>
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<tbody>
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<td>123.0859</td>
<td>0.0000</td>
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<td>MNCS_COUNTRY</td>
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<td>0.0000</td>
</tr>
<tr>
<td>INDUSTRIES_COUNTRY</td>
<td>-1.366270</td>
<td>-16.54886</td>
<td>0.0000</td>
</tr>
</tbody>
</table>

Source: Author

\[ \text{Russell1000}_t = \beta_0 + \beta_1 MNCS\_country_t + \beta_2 iShares\_country_t + \beta_3 Industry\_country_t + \epsilon_t \]  

The Wald test relating to the mixed strategy of international diversification at home by country, by multinational and by industrial sector:

The Wald test makes it possible to verify whether the addition of home-based international diversification assets through the various strategies available to American investors makes it possible to improve its average frontier variance of its initial portfolio. The null hypothesis of an MVS test assumes that:

The test result is summarized in Table 7. We notice that the probability corresponding to the statistic F is equal to zero, lower than the risk level of 5%, which allows us to conclude that our null hypothesis which assumes that the model constant is zero and the coefficients relating to the variables are equal to 1, must be rejected. So the constant is not zero and the parameters \( \beta_1, \beta_2 \) and \( \beta_3 \) are different from 1. So international diversification at home, through
derive additional gains from this diversification because this can improve his average frontier variance of his investments.

CONCLUSION

Through this study, we have evaluated the advantages of domestic international portfolio diversification for the case of American investors by holding securities relating to foreign funds traded on the American stock market. In this study we used stock market indices relating to these foreign funds known as "iShares countries), a local stock market index relating to the American financial market and stock market indices relating to financial markets relating to countries originating from iShares countries (foreign funds traded on the American financial market). The international home-based diversification strategies available to the American investor are, essentially of 2 types namely, securities of multinationals originating in these countries or securities of industrial sectors of these countries. The American investor can take advantage of his international diversification at home, by buying securities of foreign funds traded on the American stock exchange (iShares countries), only if the latter are strongly correlated with the stock market disturbances of their countries of origin and they are sheltered from all stock market disturbances in the financial market or the American economic cycle. Our results have shown that investors benefit from their domestic diversification internationally by saving all the trading and transaction costs paid in the case of direct international diversification in local financial markets and are immune to their relative idiosyncratic risks in the sense that the iShares held are correlated with their underlying stock market indices and are significantly affected by their home local stock markets. However, it turns out that these international stocks are relatively affected by the US stock market turmoil in the sense of the US stock index (Russells1000_usa) significantly affects the returns of these foreign funds. In terms of diversification strategies, we conclude that US home investors derive its benefits from indirect international diversification, primarily through the purchase of securities from international industrial sectors, while their strategy of diversification through the purchase of securities from multinationals foreign exchange negatively affects the returns of their portfolios.

REFERENCES


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