"The Sell in May" effect: Can Hofstede solve the puzzle?

A study across markets

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"The Sell in May" effect: Can Hofstede solve the puzzle?

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Abstract

The "Sell in May" effect has in previous research been referred to as a puzzle that remains to be solved. The persistence of the anomaly would pose a challenge to the notion of market efficiency and provide investors with an easy way to earn abnormal returns. With stock price data covering 99 different markets we analyze the presence of a statistically significant "Sell in May" effect in a total sample period from 1928 to 2020. Additionally, Hofstede's cultural dimensions are included in the analysis as an attempt to explain the phenomenon.

The time-series regressions provide evidence of a significant "Sell in May" effect in 30 countries which is reduced to 27 when controlling for the January effect. The SIM effect is found to have a significant and positive impact on returns in both time-series regression and panel data regression. The results suggest a more pronounced SIM effect in developed markets and geographically in Europe and Asia. Panel data regression reveals that the regions South America and Europe contribute to explaining the phenomenon with significant and positive interaction effects. Additionally, the two cultural dimensions Indulgence and Long Term Orientation are found to explain the SIM effect and Hofstede has thus provided a piece of the puzzle.

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Preface

This master thesis completes our Master of Science in Business Administration, with a specialization in Applied Finance, at the University of Stavanger.

The topic is of high relevance as investors always search for new ways of earning abnormal returns and the SIM effect, if sustainable, could be of great interest as related trading strategies are simple to implement and include few transaction costs. Additionally, this phenomenon challenges existing and fundamental economic theory on efficient markets and any findings would contribute to new empirical evidence on the efficient market hypothesis.

The process of writing this thesis has been challenging, nevertheless rewarding and has provided us with vast knowledge in the field of applied finance that we consider to be valuable for our future careers.

We extend our sincerest gratitude to our supervisor Auke Hunneman for his extensive inspiration, guidance, and feedback throughout this semester. His competence and knowledge have been an invaluable contribution to our thesis. We are greatly appreciative for his availability throughout this process in unforeseeable circumstances caused by the Covid-19 pandemic.

1 Introduction

A seemingly old and inherited market saying has created debate amongst academics, investors and the financial press where the strategy is simple and concise "Sell in May and go away" (Bouman & Jacobsen, 2002). The adage implies that the month of May marks the start of a bear market where investors would profit from liquidating their stocks and holding cash (Bouman & Jacobsen, 2002). Bouman and Jacobsen (2002) were one of the first to study whether the "Sell in May" (hereafter SIM) effect could be advantageous for investors. They named this new market efficiency anomaly: "another puzzle", and the puzzle has yet to be solved (Zhang & Jacobsen, 2021). Previous research has found empirical evidence for the SIM effect and should it remain to exist, it would challenge the notion of market efficiency (Zhang & Jacobsen, 2021). Based on established fundamental theory, the anomaly is expected to reverse itself, however this phenomenon appears to defy economic gravity (Zhang & Jacobsen, 2021).

This thesis provides three extensions of prior research. Firstly, the statistical significance of the SIM effect is tested in an extended sample period until 2020 to test the endurance of the anomaly. Second, the study introduces panel data models with random effects in order to allow for interdependence among variables, and group level heterogeneity. Lastly, we question why the SIM effect is found to be more pronounced in some regions (Bouman & Jacobsen, 2002; Degenhardt & Auer, 2018; Zhang & Jacobsen, 2021) and include Hofstede's cultural dimensions with the aim of explaining the anomaly. Time-series regression reveals a significant SIM effect in 30 countries which is reduced to 27 when controlling for the January effect. The effect appears to be more pronounced in developed markets which is consistent with previous research (Bouman & Jacobsen, 2002; Degenhardt & Auer, 2018; Zhang & Jacobsen, 2021). Panel data regression verifies the presence of a SIM effect that has a significant and positive impact on returns. The regions South America and Europe are found to contribute to the explanation of the anomaly with significant and positive interaction effects. Additionally, the results imply that two of Hofstede cultural dimensions namely Indulgence and Long Term Orientation can explain the SIM effect.

The thesis begins with a theoretical framework where the purpose is to gain a deeper understanding of the phenomenon. Section 3 introduces the data collection and processing while the applied methodology is explained in section 4. The results are presented in section 5, interpreted and discussed in section 6, before the thesis closes with a conclusion that considers the implication of the findings.

2 Previous research

This section will present a theoretical framework in order to obtain a greater understanding of the phenomenon. The section begins with a literature review across markets and is further divided into three different regions that are represented with their own subsection, respectively US, Europe, and Asia. The section ends with a presentation of potential explanations for the SIM effect and an introduction to Hofstede's cultural dimensions.

2.1 Across markets

The original study from Bouman and Jacobsen (2002) concluded that the SIM effect can be advantageous for investors when they reinvest in November as two factors usually are present. Firstly, average returns from November until April are higher than the rest of the year, implying that there is in fact a SIM effect. Second, the risk-free rate in May until October is higher than the average returns in the same period (Degenhardt & Auer, 2018). Bouman and Jacobsen (2002) examined whether monthly stock returns in 37 Morgan Stanley Capital International (MSCI) reinvestment indices from 1970 to 1998 were significantly lower in the months from May to October than the rest of the year. They discovered a SIM effect in 36 of the 37 countries in the sample, and dummy ordinary least squares (OLS) regression illustrated a statistically significant SIM effect in 20 of the MSCI indices (Degenhardt & Auer, 2018). The findings revealed that the SIM effect was especially strong and highly significant in European countries and attested to be durable over time (Bouman & Jacobsen, 2002). Considerations like data mining, risk, cross correlation between markets and the seasonal anomaly called the January effect were not proven to explain the SIM effect (Bouman & Jacobsen, 2002).

The study by Bouman and Jacobsen (2002) provided several characteristics of the SIM effect. Firstly, the effect tends to be greater in developed markets, and the findings imply that it is a calendar effect in contrast to a weather effect. In addition, there appears to be no deviation in the strength of the effect across diverse market sectors. Lastly, the higher average returns in the winter months are not accompanied with higher risk, which defies the established theory of a positive risk-return trade-off (Degenhardt & Auer, 2018).

The pivotal study from Bouman and Jacobsen (2002) is followed by further research that often reexamine the original findings in out-of-sample studies, supplement the results or include methodological changes (Degenhardt & Auer, 2018). Jacobsen and Visaltanachoti (2009) extend the research from Bouman and Jacobsen (2002) by analyzing the 19 developed markets in an out-of-sample period from 1998 to 2007. The results revealed that on average, returns were higher during November to April than during May to October in all 19 markets (Jacobsen & Visaltanachoti, 2009). Haggard and Witte (2010) also conducted an out-of-sample study and tested the 37 countries over a longer period from 1970 to 2008. They found a positive SIM effect in all of the 37 countries and increased the number of countries with a significant effect to 22 (Haggard & Witte, 2010). Haggard and Witte (2010) controlled for outliers with M-estimation techniques of Huber (1964) and Hampel (1974) that decrease the impact of extreme errors by applying reduced weights to larger squared errors (Haggard & Witte, 2010; Hampel, 1974; Huber, 1964). The Huber estimates decreased the number of statistically significant countries to 18 and they found that the impact of outliers was not uniform across countries (Haggard & Witte, 2010). Applying the Hampel estimate reduced the significant countries to 15 and provided a more anticipated pattern of significance as all the countries with a significant Hampel estimate also illustrated a significant original OLS estimate (Haggard & Witte, 2010). The study concluded that the SIM effect is robust to outliers, the January effect and transaction costs (Haggard & Witte, 2010).

Andrade, Chhaochharia, and Fuerst (2013) revisited the 37 markets in the study from Bouman and Jacobsen (2002) and tested them in the period from 1998 to 2012 by applying semi-annual returns. They confirmed that the effect remains out-of-sample with an equal economic magnitude as in the original sample of Bouman and Jacobsen (2002) (Andrade, Chhaochharia, & Fuerst, 2013). Across markets, average stock returns are found to be 10 percentage points higher in the period from November to April than in May to October (Andrade et al., 2013). The out-of-sample persistence implies that the SIM effect appears to be enduring and not fading in the time succeeding the study from Bouman and Jacobsen (2002) (Andrade et al., 2013). The SIM effect is reported to be positive in all of the 37 markets where 13 of the markets experience a significant effect (Degenhardt & Auer, 2018).

To verify the robustness of the SIM effect Zhang and Jacobsen (2021) analyzed market price returns for 114 markets and total returns in 64 markets. By considering all periods with available data until 2017 across markets they were able to prevent prior skepticism concerning sample selection bias, data mining, outliers and statistical problems. Their sample covered 23 developed countries, 23 emerging countries, 22 frontier countries and 46 additional countries that have rarely been studied (Zhang & Jacobsen, 2021). Zhang and Jacobsen (2021) criticized the methodology of Bouman and Jacobsen (2002) and argued that a more applicable test of the anomaly is to test whether summer returns are significantly higher than short term interest rates. They reported that returns in May to October are significantly lower than the risk-free rate and that 45 out of 65 markets illustrate negative average risk premium (Zhang & Jacobsen, 2021). These findings do not only challenge the notion of market efficiency but also the conventional idea of a positive risk-return relationship (Zhang & Jacobsen, 2021). Additionally, they found that average price returns are higher in November to April in 87 out of 114 countries where the difference is statistically significant in 42 countries (Zhang & Jacobsen, 2021). Thus, the SIM effect appears to be prevailing in many parts of the world. However, the size of the effect does vary across nations with a stronger effect in developed and emerging markets (Zhang & Jacobsen, 2021).

Moreover, merely six of the frontier markets exhibited a significant effect despite that 77% of the countries illustrated higher average returns during November to April compared to the rest of the year (Zhang & Jacobsen, 2021). Geographically the anomaly seems to be stronger in countries located in Europa, North America and Asia (Zhang & Jacobsen, 2021). Subsample period analysis revealed that the strongest SIM effect is observed in the last 50 years and are concentrated in developed Western European countries (Zhang & Jacobsen, 2021). Zhang and Jacobsen (2021) concluded that the SIM effect is a strong market anomaly that has strengthened rather than weakened in recent years.

The previous research across markets has overall reported evidence for the SIM effect that is seemingly robust to the January effect, outliers, time-varying volatility, and data mining. The findings imply a strong anomaly since the second half of the 20th century that have not reversed itself after the publication of the study from Bouman and Jacobsen (2002). Developed and emerging markets seem to experience a stronger effect. However, this is not present in all of the markets.

2.2 US markets

There appear to be two explanations why numerous studies focus singularly on the SIM effect in the US market. First, shocks and other movements in the US stock market tend to transfer expeditiously to other markets in a recognizable manner (Degenhardt & Auer, 2018). Second, Bouman and Jacobsen (2002) detected a significant SIM effect that was reduced after controlling for the January effect (Degenhardt & Auer, 2018).

Maberly, Pierce and Jacobsen (2004) revisited the findings of Bouman and Jacobsen (2002) for the US market from 1970 to 1998 by applying the CRSP value-weighted index. They found a significant SIM effect at the 5% level that they argue are driven by two monthly outliers: the crash in world equity prices in October 1987 and the collapse of the Long-Term Capital Management hedge fund in August 1998 (Degenhardt & Auer, 2018; Maberly, Pierce, & Jacobsen, 2004). By eliminating these two months from the analysis the significance decreased to the 10% level and when additionally controlling for the January effect the SIM effect became strongly insignificant (Degenhardt & Auer, 2018; Maberly et al., 2004).

Galai, Kedar-Levy, & Schreiber (2008) discovered a diverse pattern from 1980 to 2002 when controlling for outliers using M-estimation techniques. In their analysis of S&P 500 daily returns the SIM effect is found to be significant merely after controlling for outliers represented by months with unusually low rates of return (Galai, Kedar-Levy, & Schreiber, 2008). They emphasized the critical effect that outliers have on the empirical estimation of seasonal anomalies (Galai et al., 2008).

Lucey and Zhao (2008) revisited the findings of Bouman and Jacobsen (2002) for the US market (Lucey & Zhao, 2008). By analyzing CRSP data over the period from 1926 to 2002 they argue that the SIM effect is simply a reflection of the January anomaly (Lucey & Zhao, 2008). They concluded that when the SIM effect is present it is presumed to be driven by January returns and that the effect will not endure in the US equity market in the long run (Lucey & Zhao, 2008).

Haggard and Witte (2010) reexamined the findings of Maberly and Pierce (2004) and Lucey and Zhao (2008) by extending the sample period until 2008 and lengthening the sub-sample periods (Degenhardt & Auer, 2018). They discovered a significant SIM effect in the period after 1953 which was considered robust to outliers and the January effect (Haggard & Witte, 2010). Haggard and Witte (2010) created mean-variance efficient portfolios and illustrated that including a SIM fund to a passive market fund significantly increased risk-adjusted portfolio performance of the value-weighted CRSP index. Moreover, they found that the inclusion of a January fund does not make the optimal weights of the SIM fund insignificant, indicating that the effect is not merely the January effect in disguise (Degenhardt & Auer, 2018).

Jacobsen, Mamun and Visaltanachoti (2005) examined the relationship between the SIM effect and other prevalent anomalies for equally and value weighted portfolios selected on size, dividend yield, book-to-market ratios, earnings price ratios, and cash flow ratios for the US market. By applying Fama-French decile portfolios selected on size and value criteria from 1926 to 2004 they found that the SIM effect appears to be a market wide phenomenon independent of other anomalies (Jacobsen, Mamun, & Visaltanachoti, 2005). All of the analyzed portfolios illustrated higher average winter returns than summer returns and in most of them this difference was statistically and economically significant (Jacobsen et al., 2005). The findings indicate that the SIM effect and the January effect are different anomalies (Jacobsen et al., 2005).

Degenhardt and Auer (2018) examined if there was a SIM effect in highly liquid individual stocks and commodity futures that are expected to be particularly efficiently priced. The analysis covered monthly data in the period from 1989 to 2016 from 30 constituents of the DJIA in order to examine the effect in individual US stocks (Degenhardt & Auer, 2018). In the analysis of commodity futures 24 futures-based commodity sub-indices of the Goldman Sachs Commodity Index (GSCI) were applied (Degenhardt & Auer, 2018). The sample was divided into two sub-periods in order to study the durability of the effect over time (Degenhardt & Auer, 2018). Degenhardt and Auer (2018) applied four diverse methodologies gathered from earlier studies on the SIM effect. Firstly, the dummy variable OLS regression initially performed by Bouman and Jacobsen (2002), then a modified version adjusted for the influence of January returns. The third approach is an extension including time-varying volatility by using a GARCH(1,1) equation from Bollerslev (1986) that is contemplated to be adequate for most financial time series (Bollerslev, 1986; Degenhardt & Auer, 2018). Lastly, they applied M-estimation from Huber (1964) in order to reduce the influence of outliers (Degenhardt & Auer, 2018; Huber, 1964). Their findings detected a higher SIM effect in the stock market compared to the commodity futures market (Degenhardt & Auer, 2018). The SIM effect was considered to be robust across both methodologies and time, underpinning previous research (Degenhardt & Auer, 2018). Conversely, the effect was found to be weakened in the stock market and strengthened in the commodity market as it has become part of the available public information by the publication of Bouman and Jacobsen´s (2002) study (Degenhardt & Auer, 2018).

To sum up, the results for the US market indicate that the SIM effect was not present before the second half of the 20th century. The majority of studies report a positive effect with a minor decline after the publication of the study from Bouman and Jacobsen (2002). Conversely, evidence on the statistical significance of the effect is contradictory and appears to depend on the data and control variables. Earlier studies focus on the robustness of the SIM effect to outliers and the January effect, while later ones appear to favor an independent SIM effect.

2.3 European markets

Carrazedo, Curto and Oliveria (2016) investigated the existence of the SIM effect in the European stock market from 1992 to 2010. Focusing mainly on Dow Jones STOXX sector indices for the Eurozone and the Nordic region they confirmed the existence of a strong seasonal effect on stock returns (Degenhardt & Auer, 2018). The SIM effect was confirmed in all of the 37 indices, 23 of which reveal statistically significant differences between the winter and summer average returns (Carrazedo, Curto, & Oliveira, 2016). Carrazedo et al. (2016) provided sample evidence that the estimated monthly summer returns was 1.8% lower than the winter returns. Additionally, the majority of indices with a statistically significant SIM effect revealed negative average returns during the summer months (Degenhardt & Auer, 2018). When applying a sub-period analysis, Carrazedo, Curto and Oliveria (2016) concluded that the SIM effect is persistent over time. The anomaly was detected in the Eurozone and the Nordic region. However, the effect was found to be weaker in the Nordic regions due to higher summer returns (Carrazedo et al., 2016). Carrazedo et al. (2016) concluded that the SIM effect remains economically significant after the publication of Bouman and Jacobsen´s study (2002). However, the average return has experienced a decline of 0.7% per month (Degenhardt & Auer, 2018).

Unlike most prior research Dichtl and Drobetz (2015) chose to set an investment horizon of one year, thereby allowing an effective implementation of the SIM strategy. By doing so they were able to lessen potential data snooping problems and to exploit the small datasets in the most efficient way (Dichtl & Drobetz, 2015). Further, in contrast to Bouman and Jacobsen (2002) they avoided using the standard MSCI stock market indices arguing that investors would most likely not use them in their asset allocation (Dichtl & Drobetz, 2015). Dichtl and Drobetz (2015) chose instead to utilize data from stock market indices, mainly from Europe and US, that were easy to invest in and had lower transaction costs. In their research they included both all available index data and only index data after 2003, to account for the publication date of Bouman and Jacobsen´s (2002) study. The results suggested that the SIM effect exists when all available index data are applied. However, they discovered that in some cases the SIM effect might have been driven by a few extreme return observations (Dichtl & Drobetz, 2015). In addition, when considering index data after 2003 they documented a decreasing or even vanishing tendency of the SIM effect (Dichtl & Drobetz, 2015).

In the European markets the majority of the studies report a significant SIM effect. However, the findings emphasize an important feature. The effect has weakened after the publication of the study of Bouman and Jacobsen (2002) which is to be expected for an anomaly.

2.4 Asian markets

Several calendar effects have been demonstrated to be strong in Asian markets (Degenhardt & Auer, 2018; Holden, Thompson, & Ruangrit, 2005; Lean, Smyth, & Wong, 2007). Additionally, several of the markets can be characterized as emerging markets where exploitable inefficiencies are expected to be more pervasive (Degenhardt & Auer, 2018; Hull & McGroarty, 2014). Maberly and Pierce (2003) tested the robustness of the SIM effect to alternative model specifications of the Japanese equity market from 1970 until 2003 by applying the Nikkei 225 index. They found a significant effect that appeared to be concentrated in the period preceding the introduction of Nikkei 225 index futures in 1986 (Maberly & Pierce, 2003). However, the effect disappeared after the internationalization of the Japanese financial markets (Maberly & Pierce, 2003). This could indicate that a new market environment where arbitrage behaviors can be carried out easier may have resulted in a more efficient market and the disappearance of the SIM effect (Degenhardt & Auer, 2018).

Lean (2011) offers a broader study of the Asian market by examining daily stock returns from 1991 until 2008 of Malaysia, China, India, Japan, Hong Kong and Singapore. OLS estimation illustrated a significant SIM effect in Malaysia and Singapore (Lean, 2011). However, by extending the analysis with several time-varying volatility models a significant effect were found for most of the combinations of countries and volatility models, regardless of the inclusion of a January dummy (Lean, 2011). The conditional variance model resulted in China, India, and Japan additionally providing evidence of the SIM effect (Lean, 2011). Lean (2011) concluded that the anomaly is present in all of the markets excluding Hong Kong.

Sakakibara, Yamasaki and Okada (2013) claim that the seasonal return pattern in Japan is different and that the two appropriate seasons are from January to June and from July to December. As the return pattern of the SIM effect is shifted two months into the future, Sakakibara, Yamasaki and Okada (2013) rename the effect the "Dekansho-bushi" effect (Degenhardt & Auer, 2018; Sakakibara, Yamasaki, & Okada, 2013). They found a significant shifted effect for five Japanese stock market indices with a broadened stock selection that is robust to a January effect (Degenhardt & Auer, 2018; Sakakibara et al., 2013). By dividing the sample into post and pre the beginning of the Japanese economy crisis in 1990 they discovered a more prominent effect in the second sub-sample (Degenhardt & Auer, 2018; Sakakibara et al., 2013).

Guo, Luo and Zhang (2014) examined the largest Asian market by concentrating on a value-weighted index of Chinese A Shares constructed by GTA CSMAR from 1997 until 2013 (Degenhardt & Auer, 2018). They found strong evidence of the SIM effect in the Chinese stock market that was considered robust to diverse regression assumptions, time-varying risk, and calendar effects such as the January effect (Guo, Luo, & Zhang, 2014).

To sum up, the findings for Asian markets are not substantially different from the ones in Europe (Degenhardt & Auer, 2018). Several Asian markets display a SIM effect that is significant and mostly robust to often used tests (Degenhardt & Auer, 2018). Additionally, periods of presumably higher market efficiency have been found to abate the effect (Degenhardt & Auer, 2018). Conversely, two findings differ compared to other markets and appear to be of particular interest (Degenhardt & Auer, 2018). Firstly, there seems to be no decisive difference between developed and emerging markets. Secondly, Japan illustrates a dissimilar kind of effect where the appropriate seasons are merely the first and second half of the calendar year (Degenhardt & Auer, 2018).

2.5 Explanations for the SIM effect

Due to the empirical evidence on the SIM effect´s existence, some researchers have been motivated to search for explanations. This section presents some of the main hypotheses in the academic literature.

Doesvijk (2005) provided with his optimism cycle hypothesis an interesting explanation for the SIM effect. By linking the optimism of investors to the calendar years, Doesvijk (2005) suggests that in the last quarter of the year investors start looking forward to the next year. Doing so they are often trapped in an optimism bias resulting in overstating the economic outlook. As a consequence of this optimism and overestimation the stock returns tend to become positive (Doeswijk, 2005). The duration of the optimism is short as investors become more pessimistic when they realize that their economic outlook is not accurate (Doeswijk, 2005). At this point, the optimism fades away, investors sell their stocks, and lower market returns follow during the summer (Doeswijk, 2005). Doeswijk (2005) presents two factors to support this optimism-cycle hypothesis. Firstly, Doeswijk (2005) suggests that psychology's involvement explains why investors would fall into the same trap repeatedly. Additionally, empirical support for the optimism cycle hypothesis is presented in the form of an optimism cycle-based trading strategy with significantly positive returns and a parallel seasonal pattern in initial public offering returns (Doeswijk, 2005).

In another hypothesis, Cao and Wei (2005) investigated whether different seasonal market returns may be related to temperature. They argued that evidence suggests that lower temperature can possibly lead to aggression, whereas higher temperature can lead to apathy (Cao & Wei, 2005). Thus, they believe that returns are influenced by investors' risk-taking behavior, which is influenced by a temperature-based mood. Cao and Wei (2005) relate the high winter returns to increased aggression and therefore more risk-taking, and low summer returns to increased lethargy which impede risk-taking. By examining eight international markets, they were able to reveal a temperature anomaly, which uncovered an overall negative correlation between temperature and stock market returns (Cao & Wei, 2005).

Kamstra, Kramer and Levi (2000) offer a hypothesis which suggests that Seasonal Affective Disorder (hereafter SAD) plays a part in the seasonal time-variation of stock market returns. Based on documented psychological evidence, SAD is a medical condition which starts when days become shorter and nights longer, heightening investors' risk aversion (Kamstra, Kramer, & Levi, 2000). Therefore, they argued that during the Fall the stock returns should be lower, then become moderately higher during the winter months when days start to get longer. They were able to provide international evidence that stock market returns vary seasonally with the length of the day, resulting in the so-called SAD effect (Kamstra et al., 2000).

The existing research focus on general explanations for the anomaly, however this thesis considers another approach which is based on findings in academic literature. As empirical evidence suggests a more pronounced SIM effect in some regions one might question if there are similarities between these regions that can explain the anomaly. This thesis introduces Hofstede's cultural dimensions as a possible explanation for the SIM effect, hoping to find cultural similarities in these regions that can explain the phenomenon.

2.6 Hofstede's cultural dimensions

Hofstede's cultural dimensions theory is a framework for understanding differences in culture across countries. The framework consists of six different dimensions: Power Distance Index (PDI), Individualism versus Collectivism (IDV), Masculinity versus Femininity (MAS), Uncertainty Avoidance Index (UAI), Indulgence versus Restraint (IVR), and Long Term Orientation versus Short Term Orientation (LTO) (Hofstede, 2001; Hofstede, Hofstede, & Minkov, 2010; Hofstede Insight, 2021). The Power Distance (PDI) indicates the extent to which less powerful members of a society accept and expect an unequal distribution of power (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). The dimension concerns how society responds to inequality. Societies with a high degree of power distance accept a hierarchical order with no need for further justification (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). In societies with low Power Distance the members attempt to achieve an equal distribution of power and demand justification for inequalities (Hofstede, 2001;

Hofstede et al., 2010; Hofstede Insight, 2021). In the dimension Individualism versus Collectivism (IDV) Individualism can be described as a preference for a social framework with loose ties where people are expected to take care of themselves and their immediate family (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). On the other side is Collectivism which represents a preference for a society where individuals can expect their relatives or members of a specific group to take care of them in exchange for unconditional loyalty (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). Uncertainty Avoidance (UAI) illustrates to which extent members of a society feel uncomfortable with uncertainty and ambiguity (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). The main concern is how society responds to an unknown future and whether or not the members try to control it (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). A high score on this dimension indicates rigid beliefs and behaviors that exhibit intolerance of unorthodox behavior and concepts (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). A low score implies a more lenient approach where practice is valued over principles (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). The next dimension illustrates the contrast between Masculinity and Femininity (MAS) (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). Masculinity denotes a competitive society that values achievement, heroism, assertiveness, and material rewards for success (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). On the contrary, Femininity represents a preference of a more consensus-oriented society where cooperation, modesty, and taking care of the weak are important principles (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). Every society has to remember its past while simultaneously managing the challenges of the present and the future (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). This fundamental issue is represented in the dimension of Long Term Orientation versus Short Term Orientation (LTO) (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). A low score on this dimension represents a society that values traditions and exhibits suspicion towards societal change (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). A high score represents a more pragmatic attitude where prudence and effort in modern education is encouraged as an approach of planning for the future (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). The last dimension takes on Indulgence versus Restraint (IVR), and illustrates to what degree a society allows for a satisfaction of the member's needs (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). Indulgence denotes a society that grants fairly free satisfaction of basic and natural human drives associated with appreciating life (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). Its opposite, Restraint denotes a society that suppresses satisfaction of needs and regulates it with rigid social norms (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021).

Hofstede's cultural framework has been applied in previous research with the aim to explain differences in returns across countries. Aprayuda, Misra and Kartika (2021) examine the influence of Hofstede's four cultural dimensions: Power Distance (PDI), Individualism (IDV), Uncertainty Avoidance (UAI), and Long Term Orientation (LTO) on the investment return in Asian sustainable stock exchanges. To determine the effect of cultural dimensions on stock return, they collected monthly data from seven stock indices from Asian countries from 2015 to 2019 (Aprayuda, Misra, & Kartika, 2021). The results revealed that Asian sustainable stock returns were significantly and positively affected by the four cultural dimensions (Aprayuda et al., 2021). They conclude by underlining the following: (i) increasing Power Distance would increase the market return in the Asian region, (ii) increase of Individualism in Asian countries would lead to higher returns on sustainable stocks, (iii) the increasing Uncertainty of Avoidance by investors in the Asian region would lead to higher stock returns, and (iv) Long Term Orientation had a significant and positive impact on market returns (Aprayuda et al., 2021).

Nguyen and Truong (2013) are some of the first to investigate whether cross-country cultural differences in Individualism and Uncertainty Avoidance can unfold the information content of the international stock market. The data sample consisted of annual earnings announcements from 42 countries for the period 1990-2006 (Nguyen & Truong, 2013). They employed three measures of the information content and computed R2 from the market model, abnormal return variance and abnormal trading volume among earnings announcements (Nguyen & Truong, 2013). Nguyen and Truong (2013) found that the information content is higher in more individualistic countries and lower in countries that score high on Uncertainty Avoidance. The results indicate that high Individualism is related to overconfidence, self-attribution biases and high preferences for risk. Additionally, they infer that Uncertainty Avoidance is associated with conservatism and low preference for risk (Nguyen & Truong, 2013).

Relating the cross-country differences of stock market capitalization in 19 OECD countries to national culture, de Jong and Semenov (2002) examine whether Hofstede's cultural dimensions affect the stock market capitalization during the period from 1976 to 1995. They expected to find that the stock markets are more developed in societies with lower Uncertainty Avoidance and in societies with higher Masculinity (de Jong & Semenov, 2002). They suggest that societies with high Uncertainty Avoidance will request a higher uncertainty premium when investing, causing a reduction in the share price. Hence, one would expect a negative relation between high Uncertainty Avoidance and the development of the stock (de Jong & Semenov, 2002). Additionally, one would expect that in a highly masculine society the regulatory environment is more likely to facilitate competition in the financial system. In line with their expectations, de Jong and Semenov (2002) conclude that stock markets are more developed in countries with lower Uncertainty Avoidance and higher Masculinity.

Amirhosseini and Okere (2012) study the impact of cultural dimensions on personal investment decisions in the Tehran Stock Exchange. Their findings imply that Power Distance, Masculinity and Uncertainty Avoidance affect the investment behavior (Amirhosseini & Okere, 2012). Individualism, on the other hand, was found not found to have a significant impact on investment decisions (Amirhosseini & Okere, 2012). Amirhosseini and Okere (2012) argue that Power Distance is found to influence investment decisions since age, wealth, and status influence investors' strategic behavior, especially risk aversion. Additionally, they reason that Uncertainty Avoidance affect investment decisions since investors´ main priority when investing is to avoid uncertainty. As a possible explanation for Masculinity´s impact on investment decisions, they suggested that masculinity is often associated with higher aggression and a less risk averse behavior which might lead to higher turnovers and asset volumes (Amirhosseini & Okere, 2012).

Amory (2016) examined whether Hofstede's dimensions affected excess return from so-called sin stocks, which are stocks that are considered unethical and immoral. Masculinity and Indulgence were found to have negative coefficients significant at a 5% level (Amory, 2016). Amory (2016) suggests that when countries are considered more masculine, they are more likely to not be expected to take care of anyone else and more likely to invest in sin stocks.

Scoring high on Indulgence, gives in to the urges of individuals and allows for a more liberal fulfilment of basic human needs, making them more likely to invest in sin stocks (Amory, 2016). Amory (2016) found that countries with a high score of Masculinity have lower excess returns relative to countries with a higher score of Femininity. Furthermore, countries scoring high on Indulgence have on average lower excess returns compared to countries that score high on Restraint (Amory, 2016).

Previous research on explanations for the SIM effect implies that lower temperature and psychological factors related to SAD and an optimism bias affects risk aversion that results in higher returns during winter months (Cao & Wei, 2005; Doeswijk, 2005; Kamstra et al., 2000). As the SIM effect is found to be more pronounced in some regions a possible explanation could be cultural similarities in these regions that amplify the established potential explanations for the anomaly. Power Distance, Individualism, Uncertainty Avoidance, and Long Term Orientation were all found to have a significant and positive effect on stock returns (Aprayuda et al., 2021). Additionally, previous research finds that Masculinity, Power Distance and Uncertainty Avoidance impact investment decisions (Amirhosseini & Okere, 2012).

Countries with a high score on Indulgence often illustrate a willingness to realize their impulses and possess a positive attitude that have a tendency towards optimism (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). Moreover, a high score on Individualism is related to overconfidence, self-attribution biases and high preference for risk which are characteristics that result in investors exhibiting elevated reactions to firm specific information (Nguyen & Truong, 2013). If countries with a high score on any of these dimensions additionally exhibit the optimism bias suggested by Doesvijk (2005) it might enforce the bias and result in a stronger SIM effect.

Stock markets are found to be more developed in countries with higher Masculinity and lower Uncertainty Avoidance, and since the SIM effect appears to be more pronounced in developed markets this could indicate a relationship between these findings (de Jong & Semenov, 2002). Furthermore, it could imply that countries with a high score on Masculinity and a low score on Uncertainty Avoidance would exhibit a stronger SIM effect. Additionally, the development of stock markets could be an explanation of why the anomaly is found to be more pronounced in developed markets. Temperature is found to have a negative correlation with stock market returns and since temperature differs across countries this might explain why the SIM effect is more pronounced in some regions. Temperature appears to affect investors' risk-taking behavior which again impacts returns and thereby poses a potential explanation for the SIM effect (Cao & Wei, 2005). Moreover, several of Hofstede's cultural dimensions are also found to affect risk aversion and are thus considered to impact stock returns (Khambata & Liu, 2005). Countries that score high on Uncertainty Avoidance value careful analysis and security when making decisions (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). The dimension is associated with conservatism and low preference for risk where investors exhibit a more moderate reaction to firm-specific information (Nguyen & Truong, 2013). Countries that exhibit a high score on Long Term Orientation illustrate a strong propensity to save for the future and demonstrates thriftiness and perseverance when it comes to achieving results ((Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). However, countries with a low score focus on achieving quick results indicating a less risk averse attitude (Hofstede, 2001; Hofstede et al., 2010; Hofstede Insight, 2021). As several of Hofstede's cultural dimensions are found to affect risk aversion it is conceivable that the impact on risk aversion affects the prevalence of the SIM effect (Khambata & Liu, 2005). Since the anomaly is found to be more pronounced in some regions it might be that these regions have similar scores on Hofstede's dimension and exhibit a similar preference for risk.

The findings on both explanations for the SIM effect and the impact of Hofstede's cultural dimensions on stock returns are scarce. However, several of the cultural dimensions exhibit characteristics that might explain the SIM effect. Additionally, the six dimensions are found to have an impact on stock returns, or investment decisions (Amirhosseini & Okere, 2012; Amory, 2016; Aprayuda et al., 2021). Therefore, all of Hofstede's cultural dimensions are included in the study with the aim of contributing to solving the puzzle of the SIM effect.

3 Data

This section describes the data collection, data processing, and presents descriptive statistics for the main variables.

This thesis utilizes historical data in terms of average monthly closing prices to analyze the SIM effect. The original data is obtained from Eikon and consists of all the available monthly stock prices from all countries with accessible stock indices. The applied stock indices are the ones presented by Eikon on their country overview. In line with previous research this thesis applies the continuously compounded return which is calculated as illustrated by Equation (1) (Bouman & Jacobsen, 2002; Carrazedo et al., 2016; Zhang & Jacobsen, 2021).

$$r_t = \ln\left(\frac{C_t}{C_{t-1}}\right) \tag{1}$$

The purpose of using logarithmic returns is that the skewed distribution of the data caused by fluctuations in stock prices will to a larger extent follow a normal distribution. The dataset applied in the study consists of returns from 97 countries and two regions over a total sample period from February 1928 until December 2020. For simplicity the paper will further reference a total of 99 countries, even though West-Africa represents a regional stock exchange that includes eight countries without accessible individual stock indices. Additionally, Hong Kong is treated as an independent region as it has had the privilege of having a different economic ideology than mainland China.

As the countries have different available data in terms of index prices the individual sample period varies across countries. The motivation behind applying all available data for all countries is to prevent earlier skepticism concerning sample selection bias, data mining, and outliers and statistical problems (Zhang & Jacobsen, 2021).

As previous research have implied that the SIM effect is more pronounced in some regions the countries are divided into their respective geographical regions and status denoted by developed, emerging, frontier markets after the classification from MSCI (Bouman & Jacobsen, 2002; Degenhardt & Auer, 2018; MSCI Inc., 2021; Zhang & Jacobsen, 2021). In addition to the three market classifications from MSCI we have included rarely studied markets after the format from Zhang and Jacobsen (2021) in order to separate these countries from the rest of the sample. The sample consists of 23 developed countries, 27 emerging countries, 19 frontier countries, and 30 rarely studied countries.

Table 1: Developed markets

Status	Region	Country	Ticker	Observations	Start of sample	End of sample
Developed	*Asia*	Hong Kong	.BUX	677	08.1964	12/2020
		Japan	.N225E	671	02.1965	12/2020
		Singapore	.STI	256	09.1999	12/2020
	Europa	Austria	.ATX	419	02.1986	12/2020
		Belgium	.BFX	350	11.1991	12/2020
		Denmark	.OMXC20	372	01.1990	12/2020
		Finland	.OMXH25	391	06.1988	12/2020
		France	.FCHI	401	08.1987	12/2020
		Germany	.GDAXI	396	01.1988	12/2020
		Ireland	.ISEQ	455	02.1983	12/2020
		Italy	.FTMIB	276	01.1998	12/2020
		Netherlands	.AEX	455	02.1983	12/2020
		Norway	.OBX	255	10.1999	12/2020
		Portugal	.PSI20	336	01.1993	12/2020
		Spain	.IBEX	351	10.1991	12/2020
		Sweden	.OMXS30	411	10.1986	12/2020
		Switzerland	.SSMI	395	02.1988	12/2020
		United Kingdom	.FTSE	443	02.1984	12/2020
	Middle East	Israel	.TA35	338	11.1992	12/2020
	North America	Canada	.GSPTSE	498	07.1979	12/2020
		United States	.SPX	1115	02.1928	12/2020
	Oceania	Australia	.AXJO	343	06.1992	12/2020
		New Zealand	.NZ50	239	02.2001	12/2020

Table 2: Emerging markets

Status	Region	Country	Ticker	Observations	Start of sample	End of sample
Emerging	*Africa*	Egypt	.EGX30	274	03.1998	12/2020
		South Africa	.JTOPI	306	07.1995	12/2020
	Asia	China	.CSI300	192	01.2005	12/2020
		India	.BSESN	500	05.1979	12/2020
		Indonesia	.JKSE	368	05.1990	12/2020
		South Korea	.KS11	476	05.1981	12/2020
		Malaysia	.KLSE	467	02.1982	12/2020
		Pakistan	.KSE	319	06.1994	12/2020
		Philippines	.PSI	407	02.1987	12/2020
		Taiwan	.TWII	647	02.1967	12/2020
		Thailand	.SETI	467	02.1982	12/2020
	Europe	Czech Republic	.PX	327	10.1993	12/2020
		Greece	.ATG	358	03.1991	12/2020
		Hungary	.BUX	359	02.1991	12/2020
		Poland	.WIG	356	05.1991	12/2020
		Russia	.IMOEX	279	10.1997	12/2020
		Turkey	.XU030	287	02.1997	12/2020
	Middle East	Kuwait	.BKA	60	01.2016	12/2020
		Qatar	.QSI	268	09.1998	12/2020
		Saudi Arabia	.TASI	266	11.1998	12/2020
		United Arab Emirates	.ADI	233	08.2001	12/2020
	North America	Mexico	.MXX	407	02.1987	12/2020
	South America	Argentina	.MERV	354	07.1991	12/2020
		Brazil	.BVSP	371	02.1990	12/2020
		Chile	.SPIPSA	327	10.1993	12/2020
		Colombia	.COLCAP	155	02.2008	12/2020
		Peru	.SPBLPGPT	347	02.1992	12/2020

Table 3: Frontier markets

Status	Region	Country	Ticker	Observations	Start of sample	End of sample
Frontier	*Africa*	Kenya	.NASI	155	02.2008	12/2020
		Mauritius	.MDEX	376	08.1989	12/2020
		Morocco	.MASI	227	02.2002	12/2020
		Nigeria	.NGSEINDEX	297	04.1996	12/2020
		Tunisia	.TUNINDEX20	106	03.2012	12/2020
	Asia	Bangladesh	.DS30	94	03.2013	12/2020
		Kazakhstan	.KASE	245	08.2000	12/2020
		Sri Lanka	.CSE	329	08.1993	12/2020
		Vietnam	.VNI	245	08.2000	12/2020
	Europa	Croatia	.CRBEX	275	02.1998	12/2020
		Estonia	.OMXTGI	294	07.1996	12/2020
		Lithuania	.OMXVGI	251	02.2000	12/2020
		Romania	.BETI	278	11.1997	12/2020
		Serbia	.BELEX15	182	11.2005	12/2020
		Slovenia	.SBITOP	176	05.2006	12/2020
	Middle East	Bahrain	.BAX	215	02.2003	12/2020
		Jordan	.AMGNRLX	251	02.2000	12/2020
		Lebanon	.BLSI	275	02.1998	12/2020
		Oman	.MSI	347	02.1992	12/2020

Note: The indexes for the succeeding countries are all-share indexes: Kuwait, Bahrain, Sri Lanka and Nigeria.

Table 4: Rarely studied markets

Status	Region	Country	Ticker	Observations	Start of sample	End of sample
Rarley studied	*Africa*	Botswana	.DCIBT	236	05.2001	12/2020
		Ghana	.GSECI	119	02.2011	12/2020
		Malawi	.MALSMV	156	01.2008	12/2020
		Namibia	.FTN098	221	08.2002	12/2020
		Rwanda	.ALSIRW	93	04.2013	12/2020
		Tanzania	.TSI	139	06.2009	12/2020
		Uganda	.ALSIUG	196	09.2004	12/2020
		Zambia	.LASILZ	287	02.1997	12/2020
		Zimbabwe	.INDZI	141	04.2009	12/2020
		West Africa	.BRVMCI	267	10.1998	12/2020
	Asia	Laos	.LSXI	108	01.2012	12/2020
		Mongolia	.MNETOP20	81	04.2014	12/2020
	Europa	Bosnia and Herzegovina	.SASXIO	212	05.2003	12/2020
		Bulgaria	.SOFIX	242	11.2000	12/2020
		Iceland	.OMXIPI	336	01.1993	12/2020
		Latvia	.OMXRGI	251	02.2000	12/2020
		Luxembourg	.LUXX	263	02.1999	12/2020
		Malta	.MSE	300	01.1996	12/2020
		Montenegro	.MONEX	54	07.2016	12/2020
		North Macedonia	.MBI10	192	01.2005	12/2020
		Slovakia	.SAX	327	10.1993	12/2020
		Ukraine	.PFTSI	278	11.1997	12/2020
	Middle East	Iraq	.ISX60)	80	05.2014	12/2020
		Cyprus	.CYMNPRL	195	10.2004	12/2020
	North America	Costa Rica	.IACR	311	02.1995	12/2020
		Jamaica	.JSEMI	130	03.2010	12/2020
		Panama	.BVPSI	346	03.1992	12/2020
		Trinidad and Tobago	.TTBCOMP	12	01.2020	12/2020
	South America	Ecuador	.BVQA	98	11.2012	12/2020
		Venezuela	.IBC	106	03.2012	12/2020

Note: West Africa (.BRVM) represents a regional stock exchange for the following countries: Benin, Burkina Faso, Guinea Bissau, Ivory Coast, Mali, Niger, Senegal, and Togo. The indexes for the succeeding countries are all-share indexes: Iceland, Uganda, Rwanda and Saudi Arabia.

3.1 Descriptive statistics and presentation of variables

This section presents the variables applied in the regression models and their respective descriptive statistics.

The 99 countries are represented as variables with their returns. Descriptive statistics for the 99 variables representing the different countries are presented in table 5, 6, 7 and 8.

Table 5: Descriptive statistics for the developed markets

Country	Ticker	N	Mean	SD	Min	Median	Max	Skew	Kurt
Australia	.AXJO	343	0.0039	0.0397	-0.2380	0.0100	0.0949	−1.15	6.83
Austria	.ATX	419	0.0037	0.0688	-0.3312	0.0100	0.2173	−0.96	6.71
Belgium	.BFX	350	0.0034	0.0492	-0.2409	0.0103	0.1865	−1.04	6.46
Canada	.GSPTSE	498	0.0048	0.0457	-0.2566	0.0086	0.1334	−1.24	8.07
Denmark	.OMXC20	372	0.0071	0.0512	-0.2081	0.0096	0.1851	−0.57	4.45
Finland	.OMXH25	391	0.0049	0.0666	-0.2346	0.0070	0.2685	−0.11	4.56
France	.FCHI	401	0.0033	0.0570	-0.2599	0.0100	0.2189	−0.51	4.72
Germany	.GDAXI	396	0.0066	0.0604	-0.2933	0.0131	0.1937	−0.86	5.64
Hong Kong	.BUX	677	0.0083	0.0883	-0.5713	0.0105	0.5144	−0.76	10.36
Ireland	.ISEQ	455	0.0069	0.0601	-0.3209	0.0137	0.1964	−0.98	6.34
Israel	.TA35	338	0.0061	0.0567	-0.2008	0.0130	0.1413	−0.67	4.18
Italy	.FTMIB	276	-0.0003	0.0644	-0.2541	0.0062	0.2066	−0.32	4.38
Japan	.N225E	130	0.0128	0.0506	-0.2404	0.0066	0.3096	0.77	15.08
Netherlands	.AEX	455	0.0056	0.0568	-0.3220	0.0116	0.1614	−1.09	6.98
New Zealand	.NZ50	239	0.0082	0.0347	-0.1393	0.0114	0.0837	−1.00	5.29
Norway	.OBX	255	0.0074	0.0610	-0.2924	0.0126	0.1590	−1.23	7.12
Portugal	.PSI20	336	0.0015	0.0578	-0.2335	0.0048	0.1719	−0.38	4.35
Singapore	.STI	256	0.0010	0.0546	-0.2736	0.0075	0.1930	−0.90	6.82
Spain	.IBEX	351	0.0030	0.0607	-0.2512	0.0080	0.2246	−0.43	4.77
Sweden	.OMXS30	411	0.0066	0.0618	-0.2652	0.0120	0.2634	−0.57	5.28
Switzerland	.SSMI	395	0.0053	0.0449	-0.2099	0.0101	0.1308	−0.72	4.88
United Kingdom	.FTSE	443	0.0041	0.0447	-0.3017	0.0091	0.1348	−1.07	7.91
United States	.SPX	1115	0.0048	0.0543	-0.3559	0.0091	0.3522	−0.54	10.78

Table 6: Descriptive statistics for the emerging markets

Country	Ticker	N	Mean	SD	Min	Median	Max	Skew	Kurt
Argentina	.MERV	354	0.0149	0.1229	-0.5359	0.0173	0.7840	0.10	9.11
Brazil	.BVSP	371	0.0438	0.1589	-0.6931	0.0224	0.6931	0.67	8.78
Chile	.SPIPSA	327	0.0063	0.0549	-0.3547	0.0048	0.1654	−0.78	8.35
China	.CSI300	192	0.0086	0.0854	-0.2991	0.0109	0.2463	−0.50	4.64
Colombia	.COLCAP	155	0.0028	0.0540	-0.3212	0.0046	0.1337	−1.60	11.34
Czech Republic	.PX	327	0.0034	0.0754	-0.3165	0.0053	0.4534	0.35	9.30
Egypt	.EGX30	274	0.0090	0.0933	-0.4033	0.0054	0.3119	−0.15	4.93
Greece	.ATG	358	-0.0003	0.0916	-0.3267	0.0041	0.3541	−0.09	4.67
Hungary	.BUX	359	0.0102	0.0811	-0.4473	0.0148	0.4611	−0.14	9.10
India	.BSESN	500	0.0119	0.0756	-0.2730	0.0115	0.3506	0.08	4.88
Indonesia	.JKSE	368	0.0061	0.0757	-0.3786	0.0116	0.2502	−1.02	7.47
Kuwait	.BKA	60	0.0036	0.0445	-0.2304	0.0048	0.1175	−2.17	14.52
Malaysia	.KLSE	467	0.0032	0.0677	-0.4290	0.0060	0.2944	−0.50	8.68
Mexico	.MXX	407	0.0162	0.0889	-0.5655	0.0150	0.3623	−1.09	12.20
Pakistan	.KSE	319	0.0093	0.0847	-0.4488	0.0164	0.2411	−0.97	7.52
Peru	.SPBLPGPT	347	0.0151	0.0931	-0.4665	0.0110	0.4774	0.45	8.47
Philippines	.PSI	407	0.0064	0.0807	-0.3785	0.0104	0.4094	−0.22	7.65
Poland	.WIG	356	0.0115	0.1000	-0.4348	0.0088	0.7224	1.12	13.03
Qatar	.QSI	268	0.0074	0.0717	-0.2960	0.0075	0.2596	−0.43	5.56
Russia	.IMOEX	279	0.0125	0.1079	-0.5826	0.0167	0.4255	−0.85	8.78
Saudi Arabia	.TASI	266	0.0066	0.0697	-0.2978	0.0116	0.1790	−0.79	5.13
South Africa	.JTOPI	306	0.0079	0.0556	-0.3397	0.0104	0.1376	−0.89	7.61
South Korea	.KS11	476	0.0066	0.0739	-0.3181	0.0056	0.4106	0.23	6.01
Taiwan	.TWII	647	0.0078	0.0887	-0.4934	0.0069	0.4064	−0.27	7.65
Thailand	.SETI	467	0.0056	0.0805	-0.3592	0.0089	0.2843	−0.51	6.25
Turkey	.XU030	287	0.0159	0.1166	-0.4831	0.0158	0.5856	0.25	6.89
United Arab Emirates	.ADI	233	0.0069	0.0640	-0.2719	0.0045	0.3591	0.11	8.79

Table 7: Descriptive statistics for the frontier markets

Country	Ticker	N	Mean	SD	Min	Median	Max	Skew	Kurt
Bahrain	.BAX	215	0.0016	0.0362	-0.2065	0.0026	0.0925	−1.10	8.47
Bangladesh	.DS30	94	0.0029	0.0543	-0.1146	-0.0022	0.1793	0.68	4.18
Croatia	.CRBEX	275	0.0023	0.0758	-0.5398	0.0030	0.2968	−1.70	14.85
Estonia	.OMXTGI	294	0.0091	0.0887	-0.4498	0.0102	0.3703	−0.76	9.26
Jordan	.AMGNRLX	251	0.0020	0.0536	-0.3328	-0.0022	0.3516	−0.19	17.07
Kazakhstan	.KASE	245	0.0133	0.0924	-0.4570	0.0105	0.4367	−0.26	9.64
Kenya	.NASI	155	0.0033	0.0576	-0.2427	0.0119	0.1719	−0.99	6.31
Lebanon	.BLSI	275	-0.0018	0.0609	-0.2354	-0.0042	0.3901	1.08	11.36
Lithuania	.OMXVGI	251	0.0083	0.0647	-0.3509	0.0069	0.3608	−0.47	11.10
Mauritius	.MDEX	376	0.0071	0.0449	-0.3263	0.0040	0.1552	−0.99	13.09
Morocco	.MASI	227	0.0049	0.0444	-0.2338	0.0035	0.1834	−0.52	8.04
Nigeria	.NGSEINDEX	297	0.0068	0.0681	-0.3659	0.0030	0.3235	−0.43	7.59
Oman	.MSI	347	0.0033	0.0524	-0.3132	0.0041	0.1846	−0.47	7.68
Romania	.BETI	278	0.0084	0.0927	-0.4405	0.0125	0.2995	−0.77	7.13
Serbia	.BELEX15	182	-0.0017	0.0818	-0.4195	0.0030	0.2948	−0.84	8.78
Slovenia	.SBITOP	176	-0.0012	0.0548	-0.2115	0.0011	0.1571	−0.67	5.40
Sri Lanka	.CSE	329	0.0073	0.0682	-0.2016	0.0047	0.2253	0.19	4.02
Tunisia	.TUNINDEX20	106	0.0043	0.0341	-0.1142	0.0047	0.0815	−0.27	3.64
Vietnam	.VNI	245	0.0097	0.0972	-0.4206	0.0068	0.3258	−0.28	5.31

Table 8: Descriptive statistics for the rarely studied markets

Country	Ticker	N	Mean	SD	Min	Median	Max	Skew	Kurt
Bosnia and Herzegovina	.SASXIO	212	-0.0023	0.0774	-0.3392	-0.0037	0.4045	0.79	9.58
Botswana	.DCIBT	236	0.0057	0.0316	-0.1070	0.0027	0.1384	0.35	6.35
Bulgaria	.SOFIX	242	0.0058	0.0823	-0.4763	0.0016	0.3504	−0.77	10.36
Costa Rica	.IACR	311	0.0065	0.0561	-0.2861	0.0012	0.2511	−0.02	8.48
Cyprus	.CYMNPRL	195	-0.0146	0.1175	-0.4999	-0.0072	0.3638	−0.48	5.50
Ecuador	.BVQA	98	0.0033	0.0194	-0.0474	0.0021	0.0506	0.07	3.41
Ghana	.GSECI	119	0.0051	0.0477	-0.0967	0.0032	0.1764	0.75	4.95
Iceland	.OMXIPI	336	0.0046	0.0883	-1.2558	0.0123	0.1717	−9.12	126.63
Iraq	.ISX60)	80	-0.0092	0.0473	-0.1346	-0.0039	0.1127	−0.12	3.62
Jamaica	.JSEMI	130	0.0128	0.0506	-0.2404	0.0066	0.3096	0.77	15.08
Laos	.LSXI	108	-0.0039	0.0384	-0.1155	-0.0087	0.1655	1.32	7.51
Latvia	.OMXRGI	251	0.0093	0.0622	-0.2708	0.0065	0.2924	−0.10	8.54
Luxembourg	.LUXX	263	0.0012	0.0680	-0.3189	0.0059	0.1889	−1.29	7.79
Malawi	.MALSMV	156	0.0122	0.0429	-0.1332	0.0058	0.3063	2.22	18.09
Malta	.MSE	300	0.0047	0.0474	-0.1986	0.0000	0.2217	0.80	6.86
Mongolia	.MNETOP20	81	0.0021	0.0658	-0.2243	-0.0032	0.2445	0.56	5.99
Montenegro	.MONEX	54	-0.0003	0.0318	-0.1152	-0.0006	0.0612	−0.82	5.03
Namibia	.FTN098	221	0.0055	0.0590	-0.2421	0.0090	0.1605	−0.74	5.44
North Macedonia	.MBI10	192	0.0081	0.0915	-0.3933	-0.0012	0.3799	0.38	7.37
Panama	.BVPSI	346	0.0094	0.0349	-0.1138	0.0050	0.2264	1.49	10.76
Rwanda	.ALSIRW	93	0.0015	0.0187	-0.0631	-0.0003	0.1090	2.26	16.48
Slovakia	.SAX	327	0.0037	0.0779	-0.3687	0.0031	0.7583	3.28	36.04
Tanzania	.TSI	139	0.0095	0.0411	-0.1157	0.0015	0.1746	1.48	7.58
Trinidad and Tobago	.TTBCOMP	12	-0.0087	0.0450	-0.1407	0.0051	0.0221	−2.33	7.45
Uganda	.ALSIUG	196	0.0067	0.0707	-0.3301	0.0077	0.1828	−0.88	6.40
Ukraine	.PFTSI	278	0.0059	0.1100	-0.4033	0.0021	0.4021	−0.15	5.35
Venezuela	.IBC	106	0.2179	0.3507	-0.4055	0.1219	1.5646	1.38	5.17
West Africa	.BRVMCI	267	0.0011	0.0494	-0.1753	0.0002	0.1574	0.20	4.54
Zambia	.LASILZ	287	0.0128	0.0618	-0.1833	0.0022	0.3243	0.83	7.26
Zimbabwe	.INDZI	141	0.0355	0.1502	-0.3260	0.0038	0.8852	2.16	11.20

As illustrated in the tables above 69 of the variables experience left-skewness while the remaining 30 are skewed to the right. All of the variables exhibit a positive kurtosis that exceeds 3 indicating a leptokurtic distribution (Najim, Ikonen, & Daoud, 2004).

The dataset includes four additional variables: Year, Month, a SIM dummy, and a January dummy. Intuitively the variable Year and Month represent the year and month of each observation. Whereas the SIM dummy takes the value of 1 if the month falls in November to April and 0 otherwise, and the January dummy takes the value of 1 if the month falls in January and 0 otherwise. Since previous research are contradictory on whether the SIM effect is the January effect in disguise, we include a dummy for January in order to control for this potential relationship (Haggard & Witte, 2010; Jacobsen et al., 2005; Lucey & Zhao, 2008).

The dataset for the panel data regression includes the same variables, however most of them are reconstructed. The categorical variables representing years, and months are included as dummies as we do not expect a linear effect. This implies the inclusion of 92 dummies for the individual years and 12 dummies that represent each month. Moreover, 17 additional variables are included where 11 of them are constructed as individual dummies. The 4 dummy variables developed, emerging, frontier and rarely studied denote the market classification of each country. While the 7 dummy variables Europe, Asia, Middle East, North America, South America, Oceania and Africa mark which geographical regions the country belongs to. The last 6 variables represent Hofstede's cultural dimensions which range from low to high, respectively from 1 to 100. This data is retrieved from Hofstede Insights (2021), and the individual score of each country is presented in appendix A.1 to A.4. Depending on the country, this data originates from different years where some of the data dates back to the 1960s which could pose a limitation to the study (Hofstede Insight, 2021). However, the majority of sociologists agree that populations of nations have deeply ingrained values that shift very slowly, often over centuries (de Jong & Semenov, 2002). Considerable evidence has confirmed that this also holds for the values identified by Hofstede, as there have not been significant changes in the last century and a half, and perhaps for even longer (de Jong & Semenov, 2002).

As mentioned earlier the countries have different available data resulting in sample periods that vary across countries in an unbalanced panel. The intraclass correlation coefficient for the panel dataset is calculated to be 0.069 indicating extremely low similarity between returns from the same country.

3.2 Average monthly returns

For descriptive purposes this section presents average monthly returns for each country. Additionally, the mean returns are computed for two periods: from November to April, and from May to October. Comparing the average monthly returns for these two periods provides an indication of whether we can expect to find a SIM effect.

Table 9: Average monthly log returns in percentage for the developed markets

													Nov. - Apr.		May - Oct.	
Country	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean	SD	Mean	SD
Australia	0.16	0.41	-0.48	2.27	-0.61	-0.08	1.23	-0.15	-0.77	0.60	0.18	1.96	**0.75**	1.10	0.04	0.76
Austria	1.39	2.41	-0.09	2.60	-0.78	-0.71	0.92	-0.79	-1.93	-0.90	0.59	1.76	**1.44**	1.05	-0.70	0.92
Belgium	0.95	-0.03	-0.24	2.16	-0.46	-0.70	1.27	-0.61	-1.00	0.04	0.93	1.74	**0.92**	0.94	-0.25	0.82
Canada	0.98	0.59	-0.04	1.10	1.21	-0.40	0.73	0.51	-1.52	-0.53	1.59	1.51	**0.96**	0.61	0.00	1.00
Denmark	2.69	1.21	-0.06	1.44	1.40	-0.23	2.06	-0.83	-1.70	0.04	0.81	1.68	**1.30**	0.92	0.12	1.40
Finland	2.22	1.15	-0.57	2.60	-0.05	-1.83	1.09	-1.08	-1.94	1.63	1.94	0.82	**1.36**	1.16	-0.36	1.50
France	0.21	1.25	0.52	2.58	-0.25	-0.89	0.54	-1.26	-1.71	0.69	1.05	1.27	**1.15**	0.82	-0.48	0.98
Germany	0.41	0.80	0.24	2.74	0.67	0.14	1.34	-2.36	-2.34	1.83	2.37	2.09	**1.44**	1.08	-0.12	1.82
Hong Kong	2.50	2.09	-1.91	1.83	0.83	0.34	2.23	-1.48	-0.89	2.18	-0.53	2.80	**1.13**	1.90	0.53	1.54
Ireland	2.30	1.95	0.78	2.36	0.02	-0.77	0.55	-0.08	-1.33	-0.17	0.42	2.36	**1.70**	0.87	-0.30	0.66
Israel	-0.87	0.05	0.05	2.90	0.97	-1.53	1.31	-1.10	0.79	0.12	2.44	2.06	**1.10**	1.55	0.10	1.17
Italy	0.80	-0.31	0.36	2.08	-2.35	-1.79	0.40	-1.19	-2.17	1.07	1.64	1.06	**0.94**	0.86	-1.01	1.42
Japan	1.19	0.44	1.16	1.16	0.13	0.27	0.00	-0.72	-0.60	-0.08	1.21	1.39	**1.09**	0.33	-0.17	0.40
Netherlands	0.67	0.34	1.57	1.73	-0.14	0.57	1.24	-1.16	-1.78	0.02	1.25	2.43	**1.33**	0.75	-0.21	1.11
New Zealand	0.73	-0.51	1.63	2.32	0.00	0.19	1.69	0.44	0.55	0.64	0.73	1.45	**1.06**	0.97	0.59	0.59
Norway	-0.72	1.41	0.23	3.26	1.29	-0.15	1.31	0.05	-1.93	0.57	1.23	2.29	**1.28**	1.42	0.19	1.20
Portugal	2.46	1.29	0.21	0.10	-1.49	-2.09	0.03	-0.67	-1.38	0.85	0.75	1.68	**1.08**	0.91	-0.79	1.09
Singapore	-0.06	-0.70	-0.02	2.23	-1.93	0.92	1.86	-2.43	-1.85	0.39	1.07	1.70	**0.70**	1.14	-0.51	1.79
Spain	0.83	0.55	-0.77	1.78	-0.67	-0.98	0.01	-0.96	-0.80	1.46	1.85	1.15	**0.90**	0.97	-0.32	0.95
Sweden	1.59	2.40	-0.19	2.31	0.36	-0.41	1.90	-1.60	-1.49	0.47	1.51	1.02	**1.44**	0.95	-0.13	1.33
Switzerland	0.22	0.48	0.68	1.27	0.94	0.06	0.97	-1.16	-0.86	1.25	1.25	1.23	**0.85**	0.46	0.20	1.02
United Kingdom	0.12	0.55	0.16	1.86	-0.06	-0.80	0.89	-0.03	-0.96	0.27	0.71	2.17	**0.93**	0.88	-0.11	0.69
United States	1.11	-0.20	0.33	1.24	-0.29	0.65	1.44	0.51	-1.19	0.21	0.72	1.25	**0.74**	0.58	0.22	0.89

Note: The average returns, mean and standard deviation is presented in percentage.

Table 10: Average monthly log returns in percentage for the emerging markets

													Nov. - Apr.		May - Oct.	
Country	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean	SD	Mean	SD
Argentina	5.72	-2.68	0.98	2.60	0.16	-0.57	1.71	-0.78	3.76	2.04	-0.10	4.93	**1.91**	3.16	1.05	1.76
Brazil	8.15	7.70	0.29	7.21	0.95	4.96	5.59	1.98	1.81	2.01	5.31	6.59	**5.88**	2.91	2.88	1.90
Chile	1.38	0.75	-0.10	2.66	0.71	0.46	0.61	-1.53	-0.07	1.56	-0.23	1.27	**0.96**	1.07	0.29	1.04
China	-0.30	2.98	0.00	3.44	-0.06	-2.51	2.44	-2.06	0.26	0.64	1.22	4.27	**1.93**	1.90	-0.22	1.83
Colombia	-0.20	0.12	-1.11	2.26	-0.50	0.33	1.07	2.21	-0.30	-1.69	-1.99	3.07	**0.36**	1.95	0.19	1.35
Czech Republic	2.41	0.61	-0.30	0.93	-1.42	-2.48	2.74	0.10	-1.73	0.49	0.17	2.55	**1.06**	1.17	-0.38	1.90
Egypt	5.18	4.33	-1.34	0.93	1.80	-2.26	-1.00	1.26	0.47	2.60	-1.21	0.35	**1.38**	2.78	0.48	1.82
Greece	0.73	1.94	1.35	0.08	2.20	-1.99	-2.35	1.23	-1.58	-1.52	-0.54	0.16	**0.62**	0.91	-0.67	1.89
Hungary	3.91	-0.61	0.91	3.11	-0.49	0.16	2.15	0.45	-1.41	0.36	0.53	3.30	**1.86**	1.82	0.20	1.18
India	0.65	2.29	-0.38	1.99	0.48	1.98	2.25	1.00	1.51	-0.79	0.37	2.87	**1.30**	1.27	1.07	1.12
Indonesia	2.06	0.35	0.20	1.76	1.59	1.15	1.06	-3.81	-1.86	-0.24	0.89	4.21	**1.58**	1.49	-0.35	2.11
Kuwait	2.04	-0.52	-3.51	0.02	-0.39	0.91	2.06	1.18	-0.06	-0.60	0.76	2.41	0.20	2.14	**0.52**	1.03
Malaysia	0.89	1.88	-0.93	1.37	0.72	-0.15	0.60	-2.47	-0.73	0.26	-0.97	3.39	**0.94**	1.69	-0.29	1.19
Mexico	1.49	1.24	3.58	2.06	2.50	1.56	2.32	0.33	0.79	-0.12	0.88	2.82	**2.01**	1.02	1.23	1.07
Pakistan	3.87	2.20	0.24	2.45	-3.43	0.09	2.78	-1.56	1.24	1.01	1.22	1.08	**1.84**	1.28	0.02	2.21
Peru	1.19	3.59	1.71	3.06	1.18	0.19	1.40	0.15	2.49	0.01	0.47	2.73	**2.12**	1.20	0.90	0.97
Philippines	2.18	0.40	-0.18	1.57	1.69	1.06	1.39	-3.38	-2.11	1.75	-0.02	3.39	**1.23**	1.41	0.07	2.23
Poland	3.20	1.06	-0.56	3.28	1.54	-2.00	3.33	1.10	-1.57	0.66	0.58	3.30	**1.81**	1.67	0.51	2.00
Qatar	-1.38	-0.60	1.61	3.49	1.11	-0.17	3.35	1.97	-1.04	-1.48	-1.40	3.61	**0.89**	2.34	0.62	1.86
Russia	2.74	3.69	3.21	2.53	-1.73	-0.40	-0.33	-1.03	-0.21	0.98	2.07	3.39	**2.94**	0.60	-0.45	0.91
Saudi Arabia	0.15	1.13	1.57	3.45	-1.27	1.32	0.70	1.16	-0.56	-2.24	0.59	1.88	**1.46**	1.16	-0.15	1.45
South Africa	1.57	0.29	0.37	2.55	0.54	-0.38	0.56	0.09	-0.51	1.56	0.71	2.19	**1.28**	0.96	0.31	0.76
South Korea	1.83	-0.50	1.61	1.01	-0.05	0.04	2.01	-1.59	-0.41	-0.08	2.38	1.75	**1.35**	1.01	-0.01	1.16
Taiwan	2.99	2.51	1.25	1.84	0.19	-0.12	-0.02	-0.63	-0.51	-1.83	1.19	2.55	**2.06**	0.74	-0.49	0.73
Thailand	2.37	0.25	-0.74	2.34	-0.13	1.06	0.89	-0.50	-0.36	-0.49	-0.26	2.33	**1.05**	1.46	0.08	0.71
Turkey	1.92	-0.08	-0.46	6.35	-3.67	0.68	4.01	-4.09	2.16	4.21	1.35	6.75	**2.64**	3.16	0.55	3.67
United Arab Emirates	0.60	2.88	-0.26	2.70	-0.28	-0.10	2.14	0.44	0.83	-0.41	-1.84	1.70	**0.96**	1.83	0.44	0.96

Note: The average returns, mean and standard deviation is presented in percentage.

Table 11: Average monthly log returns in percentage for the frontier markets

													Nov. - Apr.		May - Oct.	
Country	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean	SD	Mean	SD
Bahrain	1.74	0.92	-1.85	0.14	0.06	0.13	0.57	0.39	-0.06	-0.20	-0.85	1.07	**0.20**	1.34	0.15	0.29
Bangladesh	-0.66	3.27	-0.68	-3.85	-2.41	2.34	2.88	1.64	0.76	0.66	-2.59	2.42	-0.35	2.76	**0.98**	1.87
Croatia	3.62	-0.03	-0.46	-0.05	0.73	-1.11	0.13	-1.80	-0.14	-0.33	0.70	1.70	**0.91**	1.53	-0.42	0.90
Estonia	5.60	0.89	2.68	0.72	-2.16	-0.98	2.03	3.37	-3.50	-1.63	1.15	2.74	**2.30**	1.84	-0.48	2.63
Jordan	1.04	2.63	-0.99	-0.37	-0.05	0.26	0.47	-0.29	0.87	-1.61	-0.12	0.61	**0.47**	1.28	-0.06	0.86
Kazakhstan	0.17	4.49	2.52	1.71	-0.43	-0.68	3.50	0.84	-1.94	-0.21	2.66	3.43	**2.50**	1.48	0.18	1.86
Kenya	0.50	0.06	1.88	2.54	0.28	1.46	-1.08	2.54	-1.42	-0.69	1.41	0.70	**1.18**	0.93	0.18	1.56
Lebanon	0.53	-3.40	1.09	-0.64	1.36	1.86	-2.88	-1.99	0.32	-0.44	-0.82	2.91	**-0.05**	2.12	-0.30	1.86
Lithuania	4.27	-0.66	1.00	2.07	0.50	0.32	2.03	2.08	0.79	-2.12	-0.72	0.54	**1.08**	1.88	0.60	1.53
Mauritius	2.65	-0.42	-0.73	0.50	0.65	1.52	0.43	0.28	1.16	0.41	0.64	1.44	0.68	1.24	**0.74**	0.49
Morocco	2.82	1.69	-1.50	1.51	-0.98	-0.54	-0.19	1.61	-0.88	0.29	0.71	1.52	**1.12**	1.45	-0.12	0.96
Nigeria	0.63	1.51	-1.04	2.04	4.35	1.53	-1.59	-1.35	-0.17	0.14	-0.85	2.99	**0.88**	1.61	0.48	2.20
Oman	1.45	0.21	-0.56	1.55	0.47	0.78	0.47	0.29	0.45	-1.31	-0.12	0.28	**0.47**	0.85	0.19	0.75
Romania	3.68	1.95	-0.64	1.81	0.26	1.16	2.15	-0.80	-0.66	0.11	-0.41	1.55	**1.32**	1.62	0.37	1.12
Serbia	1.02	-0.17	-1.25	1.67	0.69	-3.51	0.96	1.02	-1.30	-2.18	-1.98	2.94	**0.37**	1.85	-0.72	1.90
Slovenia	2.24	-1.68	-1.69	2.28	0.65	-0.03	0.72	-1.19	-0.73	-0.87	-1.34	0.24	**0.01**	1.88	-0.24	0.81
Sri Lanka	0.34	1.70	0.22	-2.53	2.44	0.26	0.35	2.73	0.48	2.99	0.57	-0.88	-0.10	1.45	**1.54**	1.30
Tunisia	2.73	1.25	-1.10	0.22	2.33	1.41	1.29	1.04	-3.25	-0.51	-0.31	0.41	**0.54**	1.33	0.39	2.00
Vietnam	4.72	0.51	-0.08	3.17	0.47	0.75	-2.03	0.74	0.80	-0.22	1.38	1.51	**1.87**	1.78	0.08	1.10

Note: The average returns, mean and standard deviation is presented in percentage.

Table 12: Average monthly log returns in percentage for the rarely studied markets

													Nov. - Apr.		May - Oct.	
Country	Jan.	Feb.	Mar.	Apr.	May.	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.	Mean	SD	Mean	SD
Bosnia and Herzegovina	2.66	0.19	0.03	-1.20	-1.19	-1.35	0.40	2.34	0.55	-2.11	-1.81	-1.17	**-0.22**	1.61	-0.23	1.63
Botswana	0.83	0.68	0.94	0.18	1.08	0.75	1.07	0.77	1.01	0.69	0.32	-1.47	0.25	0.89	**0.90**	0.17
Bulgaria	1.70	0.95	-3.16	1.59	0.13	1.78	2.10	1.60	0.78	-2.07	-1.08	2.59	0.43	2.15	**0.72**	1.54
Costa Rica	0.83	1.66	0.11	0.33	0.22	0.17	1.13	-0.30	0.77	0.05	1.27	1.61	**0.97**	0.65	0.34	0.52
Cyprus	1.93	-3.23	-3.61	2.31	-2.31	-1.91	-1.12	-2.82	-0.90	0.91	-6.96	0.28	-1.55	3.65	**-1.36**	1.32
Ecuador	0.45	0.76	1.33	0.40	-0.72	0.07	-1.06	0.79	-0.27	0.55	0.67	0.89	**0.75**	0.34	-0.11	0.72
Ghana	2.44	3.97	1.56	-0.21	-0.17	-0.46	0.03	-0.05	-1.01	-0.97	-1.31	2.51	**1.49**	1.94	-0.44	0.46
Iceland	2.24	1.07	0.22	1.94	-0.05	0.08	0.94	2.16	-0.55	-3.45	0.73	0.25	**1.08**	0.85	-0.15	1.88
Iraq	1.49	-2.09	-1.65	-3.77	-3.16	0.58	0.76	-0.57	-0.74	-0.68	-0.88	-0.65	**-1.26**	1.74	-0.63	1.40
Jamaica	2.14	0.34	-2.85	1.01	3.34	0.80	1.06	0.77	1.46	3.48	2.21	1.57	0.74	1.89	**1.82**	1.26
Laos	1.25	-0.66	1.28	-2.66	-0.55	-1.64	-0.04	-1.16	-1.40	-0.51	0.98	0.41	**0.10**	1.54	-0.88	0.61
Latvia	2.27	-1.38	0.02	2.84	-0.53	2.20	3.36	1.91	0.63	-0.35	0.30	-0.11	0.66	1.59	**1.20**	1.54
Luxembourg	0.30	1.77	-1.79	1.84	-1.24	-0.54	0.86	-1.41	-2.50	-0.51	2.52	2.15	**1.13**	1.62	-0.89	1.12
Malawi	-0.52	-0.29	0.85	1.36	2.26	1.64	1.40	4.13	1.65	0.81	-0.33	1.64	0.45	0.95	**1.98**	1.15
Malta	1.51	0.09	-0.50	-0.67	-0.25	1.13	1.10	-1.22	-0.24	0.59	1.05	3.08	**0.76**	1.42	0.18	0.92
Mongolia	-2.62	-0.12	-4.63	-1.73	-1.80	4.80	0.83	0.03	2.53	-0.32	2.29	2.09	-0.79	2.73	**1.01**	2.34
Montenegro	-0.35	-0.71	-1.84	-0.73	-1.88	2.24	0.56	-0.36	0.05	1.32	-0.70	1.43	-0.48	1.06	**0.32**	1.42
Namibia	0.01	0.74	-0.26	1.66	0.00	-1.08	2.28	-1.25	-0.40	1.91	1.51	1.43	**0.85**	0.82	0.24	1.51
North Macedonia	4.60	2.10	0.09	0.02	2.10	-1.33	3.23	4.30	0.93	-2.25	-4.68	0.58	0.45	3.05	**1.16**	2.57
Panama	0.84	1.33	1.32	1.58	0.48	1.27	0.76	0.50	0.61	0.52	1.20	0.86	**1.19**	0.29	0.69	0.30
Rwanda	1.60	0.55	0.76	-0.07	0.05	-0.31	0.62	-0.37	-0.19	-0.95	0.46	-0.03	**0.54**	0.61	-0.19	0.52
Slovakia	1.35	4.65	-0.12	-1.99	-1.80	-0.62	0.63	2.38	-0.66	-0.61	-0.74	1.95	**0.85**	2.34	-0.11	1.44
Tanzania	-0.04	0.53	1.49	-0.60	0.75	1.98	1.55	1.23	1.90	2.40	0.61	-0.62	0.23	0.81	**1.64**	0.59
Trinidad and Tobago	1.81	1.40	-14.07	-3.91	1.76	1.65	0.37	0.66	-0.53	-0.81	-0.95	2.21	-2.25	6.23	**0.52**	1.07
Uganda	1.20	-1.37	3.43	3.55	1.14	0.83	-0.67	-0.45	0.51	-3.51	3.59	-0.11	**1.72**	2.14	-0.36	1.70
Ukraine	1.97	4.36	1.15	3.23	-1.64	-1.48	1.71	-3.95	-2.63	-1.50	1.09	4.58	**2.73**	1.55	-1.58	1.88
Venezuela	31.28	13.08	9.64	47.04	11.88	25.71	5.37	38.42	9.88	15.76	37.09	17.36	**25.91**	14.85	17.84	12.20
West Africa	-0.56	1.71	-0.03	0.08	0.25	1.36	-3.14	-0.22	-0.97	-1.24	-0.45	4.45	**0.87**	1.94	-0.66	1.53
Zambia	1.44	1.66	2.42	-0.45	3.91	3.81	1.59	-0.77	1.74	-1.02	0.06	0.95	1.01	1.06	**1.54**	2.13
Zimbabwe	-3.23	3.65	1.29	-2.15	6.11	15.09	6.04	-1.34	-1.27	8.91	7.49	1.29	1.39	3.90	**5.59**	6.27

Note: The average returns, mean and standard deviation is presented in percentage.

As illustrated in the tables above, all of the developed markets exhibit higher average returns during November to April compared to May to October. This applies correspondingly to the emerging countries with the exception of Kuwait. The vast majority of the frontier markets reveal the same tendency excluding Bangladesh, Mauritius, and Sri Lanka. Moving to the rarely studied markets, this pattern becomes less distinctive. The average returns are more evenly distributed with a slight majority of the countries exhibiting higher average returns in the winter months. Venezuela appears to be an outlier in the sample with extraordinarily high values which is mainly due to the hyperinflation the country has been facing in recent years (Miller, 2019).

The descriptive statistics illustrate that 82 of the 99 countries exhibit higher average returns during November to April compared to the rest of the year. This might indicate the presence of a SIM effect in the majority of markets. However, the phenomenon needs to be tested for statistical significance in order to conclude.

4 Methodology

This section describes the statistical methodology applied to answer the research questions. All of the analyses have been carried out in the statistical software package R. The specifications of the different econometric models and appropriate adjustments related to the data characteristics are presented below. The thesis utilizes time-series regression and panel data regression with random effects to study the presence of a SIM effect. In addition, some of the panel data models test whether the effect can be explained by the country's respective region, status or score on Hofstede's cultural dimensions.

4.1 Model specifications

In order to test the statistical significance of the SIM effect two ordinary least squares (OLS) regressions have been carried out using time-series data. Additionally, eight panel data regressions have been conducted to account for interdependence among variables and country level heterogeneity. Model specifications for each of the ten models is presented in this section.

4.1.1 Time-series regressions

For each country two time-series regressions have been carried out with monthly return as the dependent variable, and a dummy for the SIM effect as the independent variable. The second model additionally includes a dummy for January in order to test whether this inclusion will have a significant effect and if it will reduce the SIM effect. The time-series regressions are presented in Equation 2 and 3 where μ is a constant and ε_t the usual error term.

$$R_t = \mu + \alpha_1 S_t + \varepsilon_t \tag{2}$$

$$R_t = \mu + \alpha_1 S_t + \alpha_2 J_t \varepsilon_t \tag{3}$$

The regression includes two dummy variables whereas S_t represents the SIM dummy and J_t represents the dummy for January.

4.1.2 Panel data regressions

As countries are nested within regions and previous research has implied a relationship between regions (Bouman & Jacobsen, 2002; Degenhardt & Auer, 2018; Zhang & Jacobsen, 2021) an assumption of independent observations might not be accurate. An assumption of dependent observations is a violation of OLS and in order to account for interdependence and group level heterogeneity the data was reconstructed into panel data. Conducting a Chow test allows us to formally determine whether or not we can assume parameter heterogeneity. The Chow test rejects the null hypothesis and concludes that there are differences across countries in parameters. In order to account for these differences, we estimate panel data models. Aiming to explain the SIM effect by using status, region and Hofstede's cultural dimensions as explanatory variables the panel data regressions apply random effects to maintain the variation at the country level. Testing the effect of group level variables with fixed effects would remove all the group level variation and not allow for the inclusion of Hofstede's cultural dimensions as explanatory variables (Snijders, T.A.B., Bosker, 1999). Additionally, the groups are considered to be a sample from a population, and we acknowledge that there are countries that are currently excluded from the sample and therefore random effects are utilized to infer the size of those effects (Snijders, T.A.B., Bosker, 1999).

A total of eight panel data regressions have been carried out where subscript j represents the country and subscript t represents time. The variables applied in the panel data regressions are presented in table 13.

Table 13: Panel data variables

Variable type	*Variable name*
Level 1 outcome (dependent) variable	Return
Level 2 unit identifyer	Country
Level 1 predictors	SIM, year and month
Level 2 predictors	Developed, emerging, frontier and rarely studied markets
	Europe, Asia, Middle East, North America, South America, Oceania and Africa
	Hofstede's cultural dimensions: PDI, IDV, MAS, UAI, LTO, IVR

Note: The variables PDI, IDV, MAS, UAI, LTO and IVR refer to Hofstede's cultural dimensions respectively Power Distance (PDI), Individualism versus Collectivism (IDV), Masculinity versus Femininity (MAS), Uncertainty Avoidance (UAI), Long Term Orientation versus Short Term Orientation (LTO) and Indulgence versus Restraint (IVR).

The first panel data regression specified in Equation (4) was constructed as a random intercept model to test whether the returns are different across countries. The two subsequent models include level 1 and level 2 predictors in order to test the effect while allowing for differences across countries and are expressed in Equation (5), and (6). Chi-square tests were applied to test whether the reduction in the residual sum of squares was statistically significant when expanding the model specification. The results indicate a significant improvement in fit by including the level 1 and level 2 predictors and these variables are therefore included in the subsequent models. Equation (5) include all the level 1 predictors presented in table 13, while

Equation (6) additionally include the level 2 predictors for the country's status and region. This entails that Equation (6) does not include all the level 2 predictors presented in table 13 as Hofstede's cultural dimensions are currently excluded. In the last two specifications illustrated in Equation (7) and (8), a random coefficient is included to allow the explanatory variables to have a different effect for each country. The last model specification in Equation (8) additionally includes an interaction effect between the SIM dummy and the level 2 predictors with the aim of explaining the SIM effect with a country's status and region.

$$R_{jt} = \gamma_0 + \mu_{jt} \text{ where } \mu_{jt} = \mu_j + \varepsilon_{jt} \tag{4}$$

$$R_{jt} = \gamma_0 + \gamma_1 SIM_{jt} + \sum_{k=1}^{92} \gamma_k Year_{k jt} + \sum_{k=1}^{12} \gamma_k Month_{k jt} + \mu_{jt} \text{ where } \mu_{jt} = \mu_j + \varepsilon_{jt} \tag{5}$$

$$R_{jt} = \gamma_0 + \gamma_1 SIM_{jt} + \sum_{k=1}^{92} \gamma_k Year_{k jt} + \sum_{k=1}^{12} \gamma_k Month_{k jt} + \sum_{k=1}^{4} \gamma_k Status_{k j} + \sum_{k=1}^{7} \gamma_k Region_{k j} + \mu_{jt}$$
$$\text{where } \mu_{jt} = \mu_j + \varepsilon_{jt} \tag{6}$$

$$R_{jt} = \beta_{0j} + \beta_{1j} X_{jt} \text{ where } \beta_{0j} = \gamma_0 + \mu_{0j} \text{ and } \beta_{1j} = \gamma_1 + \mu_{1j} \tag{7}$$

$$R_{jt} = \beta_{0j} + \beta_{1j} X_{jt} \text{ where } \beta_{0j} = \gamma_0 + \mu_{0j},\ \beta_{1j} = \gamma_{10} + \gamma_1 \sum_{k=1}^{7} \gamma_k Region_k + \gamma_1 \sum_{k=1}^{4} \gamma_k Status_k + \mu_{1j} \tag{8}$$

The same model specifications are carried out for three models that additionally include Hofstede's cultural dimensions as explanatory variables. However, 25 of the countries did not have an available score on Hofstede's dimensions. Two approaches commonly used when dealing with missing data is either to remove all variables missing or to impute values for all missing data (Cismondi et al., 2013). In the first approach information loss can occur with possible bias and there can be loss of statistical power. Whereas imputing values for all the missing data can create unrealistic information in the dataset, which in turn could be biased (Cismondi et al., 2013). Since the total sample is large and removing the variables with missing values would not result in a vast loss of statistical power, the 25 variables with missing values were omitted from the sample resulting in a new sample of 74 countries. This could impose a bias in the sample. However, as both approaches would involve a potential bias and the information loss is considered to be minimal the first approach is applied.

Equation (9) illustrates a random intercept model that in addition to the previous model specifications include Hofstede's six cultural dimensions and thus include all the level 1 and level 2 predictors presented in table 13. Equation (10) and (11) specify random coefficient models that include the same variables as the random intercept model. However, Equation (11) additionally includes an interaction effect between the SIM dummy and Hofstede's cultural dimensions with the aim of explaining the anomaly.

$$R_{jt} = \gamma_0 + \gamma_1 SIM_{jt} + \sum_{k=1}^{92} \gamma_k Year_{k jt} + \sum_{k=1}^{12} \gamma_k Month_{k jt} + \sum_{k=1}^{4} \gamma_k Status_{k j} + \sum_{k=1}^{7} \gamma_k Region_{k j} + \gamma_2 PDI_j + \gamma_3 IDV_j + \gamma_4 MAS_j + \gamma_5 UAI_j + \gamma_6 LTO_j + \gamma_7 IVR_j + \mu_{jt} \text{ where } \mu_{jt} = \mu_j + \varepsilon_{jt} \quad (9)$$

$$R_{jt} = \beta_{0j} + \beta_{1j} X_{jt} \text{ where } \beta_{0j} = \gamma_0 + \mu_{0j} \text{ and } \beta_{1j} = \gamma_1 + \mu_{1j} \quad (10)$$

$$R_{jt} = \beta_{0j} + \beta_{1j} X_{jt} \text{ where } \beta_{0j} = \gamma_0 + \mu_{0j}, \text{ and } \beta_{1j} = \gamma_{10} + \gamma_{11} PDI + \gamma_{12} IDV + \gamma_{13} MAS + \gamma_{14} UAI + \gamma_{15} LTO + \gamma_{16} IVR + \mu_{1j} \quad (11)$$

5 Results

This section will present the findings on the statistical significance of a SIM effect and whether it can be explained by a country's status, region or score on Hofstede's cultural dimensions. As described in section 4 we have carried out two OLS regressions for each of the dependent variables both excluding and including a dummy variable for January to test the statistical significance of the SIM effect. Eight panel data regressions with random effect are conducted in order to test the statistical significance while allowing for interdependence among variables and country level heterogeneity. Additionally, two of the panel data models include interaction effects with the aim of explaining the SIM effect by a country's status, region or score on Hofstede's cultural dimensions.

5.1 Time-series regression

The results from the OLS regressions are presented in tables categorized in the countries respective status classification.

As illustrated in table 14, 14 of the developed countries exhibit a significant relationship between the SIM dummy and the country´s return in both model specifications. However, the distribution of significance slightly changes for some of the countries. The SIM dummy for Denmark turns insignificant while it becomes significant for Israel after controlling for the January effect. The coefficients for Ireland, Portugal and Sweden remain significant, however at a lower significance level. The United Kingdom exhibits a change in the opposite direction where the SIM dummy remains significant although at a higher significance level after controlling for the January effect. The SIM effect for Japan, and Canada remain significant at the same level in both model specifications while it remains statistically insignificant for Singapore, Hong Kong, and the United States.

12 of the countries with a significant SIM effect are located in Europe which is reduced to 11 countries when controlling for the January effect as the SIM dummy for Denmark becomes insignificant. This corresponds to 73.33% of the European sample in the developed markets. Denmark is part of the Nordic region where results for the rest of the countries vary. Sweden and Finland exhibit a significant SIM effect in both model specifications while Norway stays insignificant. The remaining of the developed countries are located in Asia and North America with the inclusion of the Middle East in the second model specification, which are all represented with one country each with a significant SIM effect. All of the countries illustrate

a positive coefficient for the SIM dummy, indicating a statistically significant and positive impact on returns.

Table 15 presents five emerging countries with a significant SIM dummy in both model specifications. However, similar to the developed markets it is not the same countries that exhibit a significant SIM effect in both model specifications. The coefficients for Malaysia and South Korea become insignificant while Saudi Arabia and China illustrate a significant relationship when extending the model. Moreover, Russia and Taiwan remain significant although at a lower significance level when controlling for the January effect. In the first model specification four of the five countries with a significant SIM effect are located in Asia while one is a European country. The inclusion of a January dummy reduces the number of Asian countries with a significant SIM effect to three and introduces one Middle Eastern country. Additionally, the SIM effect for the European country Russia remains significant in both model specifications.

As illustrated in table 16, four frontier countries exhibit a significant SIM dummy which is decreased to three in the second model specification. Two of the countries are located in Asia, one in Europe and the last country is located in Africa. However, the SIM effect for Morocco becomes insignificant when controlling for the January effect resulting in no significant effect for any of the African countries. The SIM effect for Sri Lanka and Kazakhstan remain significant at the same level in both model specifications, however Sri Lanka with a negative coefficient, and Kazakhstan with a positive coefficient. Additionally, the SIM dummy for Estonia remains statistically significant however at a lower significance level. All the countries with a significant SIM effect additionally exhibit positive coefficients, with the exception of Sri Lanka. This implies that the SIM effect has a positive impact on returns in Estonia, Kazakhstan and Morocco and a negative impact in Sri Lanka.

Table 17 demonstrates a statistically significant relationship in seven of the rarely studied countries which is reduced to five in the second model specification. The SIM effect for Ghana, Malawi and Tanzania turn insignificant while it becomes significant for Uganda when controlling for the January effect. The SIM effect for Ukraine and West Africa remains significant but now at the 0.05 level. Four of the significant countries are African countries, two are European countries while the remaining country is located in South America. However, the number of African countries with a significant SIM effect is reduced to two when extending the model. The Nordic country Iceland is found to be insignificant in both model specifications which adds to the varying results for the region. All the five countries with a significant SIM effect in the second model specification additionally exhibit a positive coefficient which implies a positive effect on returns.

Table 14: Time-series regression output for the developed markets

	Model 1: excluding January effect				*Model 2: including January effect*						
Country	SIM Coefficient	p-values of SIM dummy	Standard deviation	Multiple R-Squared	SIM Coefficient	p-values of adjusted SIM dummy	Standard deviation	January Coefficient	p-values of January dummy	Standard deviation	Multiple R-Squared
Australia	0.00714	0.09620	0.0043	0.00809	0.00831	0.06500	0.0045	-0.00711	0.38700	0.0082	0.01028
Austria	0.02144	** 0.00137	0.0067	0.02431	0.02154	** 0.00215	0.0070	-0.00064	0.96015	0.0128	0.02432
Belgium	0.01168	* 0.02610	0.0052	0.01413	0.01162	* 0.03480	0.0055	0.00032	0.97460	0.0100	0.01414
Canada	0.00962	* 0.01860	0.0041	0.01112	0.00958	* 0.02550	0.0043	0.00024	0.97510	0.0078	0.01112
Denmark	0.01173	* 0.02700	0.0053	0.01315	0.00894	0.10690	0.0055	0.01678	0.09420	0.0100	0.02062
Finland	0.01724	* 0.01030	0.0067	0.01681	0.01555	* 0.02720	0.0070	0.01029	0.42180	0.0128	0.01845
France	0.01631	** 0.00404	0.0056	0.02052	0.01816	** 0.00228	0.0059	-0.01120	0.29848	0.0108	0.02318
Germany	0.01562	** 0.00991	0.0060	0.01676	0.01769	** 0.00538	0.0063	-0.01241	0.27824	0.0114	0.01970
Hong Kong	0.00599	0.37800	0.0068	0.00115	0.00328	0.64500	0.0071	0.01639	0.20500	0.0129	0.00354
Ireland	0.01992	*** 0.00038	0.0056	0.02755	0.01874	** 0.00140	0.0058	0.00724	0.49760	0.0107	0.02854
Israel	0.01023	0.09710	0.0061	0.00817	0.01414	* 0.02810	0.0064	-0.02378	* 0.04170	0.0116	0.02040
Italy	0.01944	* 0.01200	0.0077	0.02284	0.01971	* 0.01520	0.0081	-0.00162	0.91180	0.0146	0.02288
Japan	0.01257	** 0.00284	0.0042	0.01324	0.01238	** 0.00504	0.0044	0.00116	0.88519	0.0080	0.01327
Netherlands	0.01545	** 0.00360	0.0053	0.01855	0.01674	** 0.00262	0.0055	-0.00792	0.43454	0.0101	0.01988
New Zealand	0.00477	0.28830	0.0045	0.00476	0.00540	0.25190	0.0047	-0.00393	0.65170	0.0087	0.00562
Norway	0.01098	0.15100	0.0076	0.00813	0.01492	0.06210	0.0080	-0.02403	0.09830	0.0145	0.01884
Portugal	0.01873	** 0.00285	0.0062	0.02634	0.01597	* 0.01490	0.0065	0.01654	0.16220	0.0118	0.03204
Singapore	0.01225	0.07240	0.0068	0.01265	0.01377	0.05430	0.0071	-0.00927	0.47600	0.0130	0.01463
Spain	0.01216	0.06040	0.0065	0.01006	0.01230	0.07030	0.0068	-0.00086	0.94410	0.0123	0.01008
Sweden	0.01566	** 0.00999	0.0061	0.01612	0.01536	* 0.01600	0.0063	0.00185	0.87300	0.0115	0.01618
Switzerland	0.00658	0.14600	0.0045	0.00538	0.00781	0.09930	0.0047	-0.00760	0.38110	0.0087	0.00732
United Kingdom	0.01046	* 0.01370	0.0042	0.01371	0.01204	** 0.00674	0.0044	-0.00971	0.23101	0.0081	0.01693
United States	0.00519	0.11100	0.0033	0.00228	0.00446	0.19100	0.0034	0.00441	0.47700	0.0062	0.00274

Note: Significance level *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 15: Time-series regression output for the emerging markets

	Model 1: exluding January effect				*Model 2: including January effect*						
Country	SIM Coefficient	p-values of SIM dummy	Standard deviation	Multiple R-Squared	SIM Coefficient	p-values of adjusted SIM dummy	Standard deviation	January Coefficient	p-values of January dummy	Standard deviation	Multiple R-Squared
Argentina	0.00847	0.51700	0.0131	0.00119	0.00097	0.94360	0.0137	0.04553	0.06830	0.02490	0.01062
Brazil	0.06920	0.02993	0.0164	0.00890	0.02539	0.14140	0.0172	0.02723	0.38300	0.03117	0.01094
Chile	0.00652	0.28400	0.0061	0.00354	0.00568	0.37300	0.0064	0.00511	0.65900	0.01157	0.00414
China	0.02149	0.08110	0.0123	0.01592	0.02596	* 0.04470	0.0128	-0.02682	0.25000	0.02324	0.02281
Colombia	0.00177	0.83900	0.0087	0.00027	0.00281	0.75800	0.0091	-0.00667	0.69700	0.01707	0.00127
Czech Republic	0.01443	0.08370	0.0083	0.00918	0.01178	0.17700	0.0087	0.01606	0.31100	0.01583	0.01232
Egypt	0.00848	0.45300	0.0113	0.00207	0.00104	0.93000	0.0117	0.04602	* 0.03400	0.02160	0.01851
Greece	0.01280	0.18700	0.0097	0.00489	0.01258	0.21600	0.0101	0.00137	0.94200	0.01860	0.00491
Hungary	0.01642	0.05500	0.0085	0.01028	0.01243	0.16400	0.0089	0.02462	0.13300	0.01636	0.01654
India	0.00227	0.73710	0.0068	0.00023	0.00356	0.61640	0.0071	-0.00778	0.54800	0.01295	0.00095
Indonesia	0.01942	* 0.01370	0.0078	0.01650	0.01849	* 0.02520	0.0082	0.00565	0.70710	0.01503	0.01688
Kuwait	-0.00317	0.78500	0.0116	0.00129	-0.00686	0.57400	0.0121	0.02214	0.31700	0.02195	0.01881
Malaysia	0.01234	* 0.0488	0.0062	0.00832	0.01243	0.05830	0.0065	-0.00058	0.96140	0.01198	0.00833
Mexico	0.00785	0.37400	0.0088	0.00195	0.00886	0.33820	0.0092	-0.00623	0.71290	0.01693	0.00229
Pakistan	0.01790	0.05910	0.0094	0.01119	0.01389	0.16100	0.0099	0.02432	0.17900	0.01808	0.01683
Peru	0.01225	0.22100	0.0100	0.00434	0.01407	0.18000	0.0105	-0.01122	0.56000	0.01923	0.00533
Philippines	0.01152	0.15000	0.0080	0.00511	0.00965	0.25000	0.0084	0.01150	0.45400	0.01534	0.00649
Poland	0.01300	0.22000	0.0106	0.00424	0.01026	0.35600	0.0111	0.01661	0.41400	0.02030	0.00612
Qatar	0.00297	0.73600	0.0088	0.00043	0.00743	0.41900	0.0092	-0.02716	0.10500	0.01669	0.01032
Russia	0.03378	** 0.00872	0.0128	0.02457	0.03417	* 0.01150	0.0134	-0.00234	0.92350	0.02440	0.02460
Saudi Arabia	0.01608	0.05990	0.0085	0.01335	0.01864	* 0.03740	0.0089	-0.01563	0.33500	0.01618	0.01683
South Africa	0.00971	0.12700	0.0063	0.00765	0.00914	0.17100	0.0067	0.00349	0.77500	0.01216	0.00792
South Korea	0.01367	* 0.04350	0.0068	0.00857	0.01272	0.07340	0.0071	0.00576	0.65620	0.01292	0.00898
Taiwan	0.02540	*** 0.00026	0.0069	0.02053	0.02356	** 0.00120	0.0072	0.01118	0.39730	0.01320	0.02162
Thailand	0.00965	0.19500	0.0074	0.00360	0.00706	0.36600	0.0078	0.01589	0.26600	0.01426	0.00626
Turkey	0.02095	0.12800	0.0137	0.00810	0.02234	0.12200	0.0144	-0.00865	0.74400	0.02652	0.00847
United Arab Emirates	0.00511	0.54300	0.0084	0.00160	0.00579	0.51300	0.0088	-0.00410	0.79900	0.01612	0.00188

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1.

Table 16: Time-series regression output for the frontier markets

	Model 1: excluding January effect				*Model 2: including January effect*						
Country	SIM Coefficient	p-values of SIM dummy	Standard deviation	Multiple R-Squared	SIM Coefficient	p-values of adjusted SIM dummy	Standard deviation	January Coefficient	p-values of January dummy	Standard deviation	Multiple R-Squared
Bahrain	0.00035	0.94400	0.00495	0.00002	-0.00259	0.61400	0.00514	0.01854	0.05300	0.00953	0.01756
Bangladesh	-0.01399	0.21400	0.01117	0.01677	-0.01356	0.25100	0.01173	-0.00281	0.90000	0.02234	0.01694
Croatia	0.01314	0.15100	0.00913	0.00753	0.00793	0.40530	0.00951	0.03244	0.06540	0.01754	0.01986
Estonia	0.02755	** 0.00754	0.01024	0.02420	0.02105	* 0.04960	0.01068	0.03953	* 0.04350	0.01950	0.03779
Jordan	0.00521	0.44200	0.00678	0.00237	0.00411	0.56300	0.00710	0.00687	0.60100	0.01311	0.00347
Kazakhstan	0.02341	* 0.04720	0.01174	0.01611	0.02800	* 0.02350	0.01229	-0.02799	0.21340	0.02243	0.02240
Kenya	0.01703	0.06560	0.00918	0.02198	0.01831	0.05900	0.00962	-0.00822	0.64900	0.01801	0.02332
Lebanon	0.00238	0.74700	0.00736	0.00038	0.00125	0.87200	0.00772	0.00702	0.62200	0.01423	0.00127
Lithuania	0.00458	0.57600	0.00819	0.00126	-0.00153	0.85720	0.00848	0.03819	* 0.01550	0.01566	0.02464
Mauritius	-0.00055	0.90610	0.00463	0.00004	-0.00442	0.35898	0.00482	0.02351	** 0.00764	0.00877	0.01891
Morocco	0.01225	* 0.03750	0.00585	0.01910	0.00901	0.14090	0.00610	0.02037	0.07230	0.01128	0.03318
Nigeria	0.00410	0.60500	0.00792	0.00091	0.00460	0.58000	0.00831	-0.00309	0.84000	0.01525	0.00105
Oman	0.00271	0.63100	0.00563	0.00067	0.00081	0.89100	0.00590	0.01174	0.27900	0.01082	0.00408
Romania	0.00943	0.39700	0.01112	0.00260	0.00478	0.68100	0.01163	0.02831	0.18100	0.02111	0.00908
Serbia	0.01090	0.37000	0.01213	0.00447	0.00964	0.45000	0.01273	0.00770	0.74000	0.02314	0.00508
Slovenia	0.00238	0.77400	0.00828	0.00047	-0.00198	0.81910	0.00864	0.02677	0.09530	0.01596	0.01646
Sri Lanka	-0.01649	* 0.02807	0.00748	0.01467	-0.01735	* 0.02775	0.00785	0.00519	0.71678	0.01430	0.01506
Tunisia	0.00093	0.88900	0.00665	0.00019	-0.00317	0.64400	0.00684	0.02664	* 0.04220	0.01295	0.03964
Vietnam	0.01770	0.15400	0.01239	0.00833	0.01209	0.35200	0.01295	0.03421	0.14900	0.02365	0.01683

Note: Significance level *** $p<0.01$, ** $p<0.05$, * $p<0.1$.

Table 17: Time-series regression output for the rarely studied markets

	Model 1: excluding January effect				*Model 2: including January effect*						
Country	SIM Coefficient	p-values of SIM dummy	Standard deviation	Multiple R-Squared	SIM Coefficient	p-values of adjusted SIM dummy	Standard deviation	January Coefficient	p-values of January dummy	Standard deviation	Multiple R-Squared
Bosnia and Herzegovina	-0.00012	0.99100	0.01065	0.00000	-0.00579	0.60330	0.01112	0.03467	0.09190	0.02047	0.01353
Botswana	-0.00662	0.10762	0.00410	0.01103	-0.00780	0.07103	0.00430	0.00719	0.36381	0.00790	0.01453
Bulgaria	-0.00284	0.78900	0.01060	0.00030	-0.00531	0.63300	0.01111	0.01507	0.45600	0.02018	0.00263
Costa Rica	0.00629	0.32300	0.00636	0.00316	0.00656	0.32600	0.00667	-0.00165	0.89300	0.01227	0.00322
Cyprus	-0.00249	0.88300	0.01687	0.00011	-0.00934	0.59700	0.01763	0.04195	0.19300	0.03213	0.00892
Ecuador	0.00857	* 0.02840	0.00385	0.04904	0.00914	* 0.02610	0.00404	-0.00355	0.63160	0.00738	0.05135
Ghana	0.01914	* 0.02810	0.00861	0.04054	0.01740	0.05590	0.00901	0.01137	0.50600	0.01704	0.04421
Iceland	0.01221	0.20600	0.00963	0.00479	0.00989	0.32900	0.01011	0.01395	0.44600	0.01828	0.00653
Iraq	-0.00600	0.57500	0.01064	0.00405	-0.01110	0.31900	0.01106	0.03231	0.12700	0.02096	0.03387
Jamaica	-0.01098	0.21699	0.00885	0.01188	-0.01361	0.14432	0.00926	0.01678	0.33608	0.01738	0.01908
Laos	0.00983	0.18470	0.00737	0.01653	0.00753	0.33180	0.00773	0.01380	0.32580	0.01398	0.02558
Latvia	-0.00559	0.47720	0.00786	0.00203	-0.00870	0.29080	0.00822	0.01939	0.20230	0.01517	0.00857
Luxembourg	0.02027	* 0.01540	0.00831	0.02229	0.02187	* 0.01260	0.00871	-0.01001	0.53390	0.01607	0.02374
North Macedonia	-0.00707	0.59400	0.01323	0.00150	-0.01537	0.26560	0.01376	0.04981	* 0.04690	0.02490	0.02220
Malawi	-0.01530	* 0.02550	0.00679	0.03197	-0.01336	0.06250	0.00712	-0.01164	0.36750	0.01288	0.03711
Malta	0.00576	0.29300	0.00547	0.00371	0.00426	0.45900	0.00574	0.00903	0.38500	0.01038	0.00624
Mongolia	-0.01671	0.25600	0.01461	0.01629	-0.01314	0.39400	0.01532	-0.02318	0.43000	0.02923	0.02416
Montenegro	-0.00749	0.39200	0.00867	0.01412	-0.00760	0.41000	0.00916	0.00076	0.96600	0.01748	0.01416
Namibia	0.00620	0.43600	0.00795	0.00277	0.00787	0.34600	0.00834	-0.01022	0.50300	0.01524	0.00483
Panama	0.00502	0.18142	0.00375	0.00517	0.00569	0.14826	0.00393	-0.00416	0.56402	0.00721	0.00613
Rwanda	0.00705	0.06900	0.00383	0.03589	0.00506	0.20530	0.00397	0.01279	0.09250	0.00752	0.06590
Slovakia	0.00962	0.26500	0.00861	0.00383	0.00864	0.34000	0.00904	0.00597	0.71600	0.01641	0.00423
Tanzania	-0.01427	* 0.04038	0.00689	0.03031	-0.01376	0.05986	0.00725	-0.00314	0.81563	0.01342	0.03070
Trinidad and Tobago	-0.02769	0.30800	0.02580	0.10330	-0.03581	0.21900	0.02707	0.04871	0.34600	0.04897	0.19210
Uganda	0.02097	0.03760	0.01001	0.02210	0.02197	* 0.03800	0.01052	-0.00617	0.74800	0.01920	0.02262
Ukraine	0.04314	*** 0.00099	0.01296	0.03860	0.04465	** 0.00116	0.01360	-0.00917	0.71064	0.02468	0.03908
Venezuela	0.07976	0.24129	0.06768	0.01305	0.07004	0.32564	0.07092	0.06442	0.63372	0.13481	0.01522
West Africa	0.01547	* 0.01030	0.00599	0.02457	0.01830	** 0.00375	0.00626	-0.01725	0.13069	0.01138	0.03299
Zambia	-0.00534	0.46538	0.00730	0.00187	-0.00615	0.42222	0.00766	0.00507	0.71918	0.01410	0.00233
Zimbabwe	-0.04162	0.10014	0.02514	0.01933	-0.03279	0.21474	0.02631	-0.05538	0.26063	0.04903	0.02831

Note: Significance level *** $p<0.01$, ** $p<0.05$, * $p<0$.

The results from the OLS regressions reveal a statistically significant effect in 30 countries which is reduced to 27 when controlling for the January effect. Out of the 30 countries that are found to have a significant SIM effect in the first model specification 14 are classified as developed markets which corresponds to 46.67%. Since the total of countries with a significant SIM effect decreases to 27 in the second model specification the percentage of developed countries increases to 51.85%. The corresponding results for the countries classified as emerging markets are 16.67% and 18.52% respectively. The frontier countries exhibit the lowest proportion of countries with a significant SIM effect with 13.33% in the first model specification and 11.11% in the second model. Lastly, the rarely studied countries illustrate 23.33% and 18.52% in the two model specifications. When considering the countries within their own market classification the results could change as the sample size varies across the four status classifications. In the developed markets, 60.87% of the countries exhibit a significant SIM effect while this applies to merely 18.52% of the emerging countries. Since the number of countries with a significant SIM effect remains the same in both model specifications for these two markets, controlling for the January effect does not affect these percentages. Controlling for the January effect has to some extent influenced the results for the developed and emerging markets as the distribution of significance has slightly changed. However, the number of countries with a significant relationship remains the same. This is not the case for the frontier and rarely studied markets, where the number of significant countries decreases in the second model specification. The percentage of countries exhibiting a significant effect in the frontier market is reduced from 21.05% to 15.79% while it decreases from 23.33% to 16.67% for the rarely studied markets.

Europe accommodates 16 countries that exhibit a significant SIM effect which is reduced to 15 in the second model specification. A similar reduction applies for the Asian markets where the seven initial significant countries decrease to six. When considering the whole sample of countries that are found to have a significant SIM effect, Europe constitutes 53.33% which increases to 55.56% in the second model specification. For Asia this makes up respectively 23.33% and 22.22%. None of the remaining regions represents a higher percentage than Europe and Asia. When focusing on the countries within their own region the results might be different since the sample size varies across regions. However, this is not the case and Europe continues to be the country with the highest effect measured in number of countries with a significant SIM effect with 43.24% and 40.54% in the two model specifications. Furthermore, Asia remains second with 38.89% which decreases to 33.33% when controlling for the January effect. North America and South America accommodate one country each that illustrates a significant SIM effect. Five of the countries that illustrate a significant SIM effect are located in Africa, however this number is decreased to three when controlling for the January effect. The second model specification results in two countries located in the Middle East exhibiting a significant SIM effect.

The results suggest that the January effect can partially impact the SIM effect. However, the anomaly prevails after controlling for the January effect without any major implications. It does influence the significance of individual countries, nevertheless the main results for the different regions and market classifications are not severely affected. For illustrative purposes, the map in figure 1 displays coefficients for the SIM dummies from the second model specification plotted in their respective country.

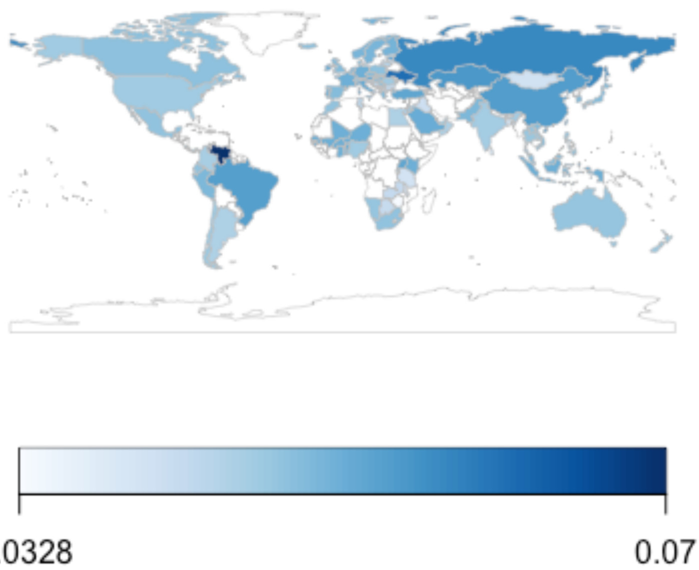

Figure 1: The coefficients for the SIM effect across countries

Note: The map is created in the statistical software package R. Since West Africa is not a country the coefficient for this region is plotted in the countries that the stock index represents. This means that these countries are included with equal coefficients. Hong Kong is excluded from the map since it is not considered to be an independent country.

The SIM effect for Russia, China, Ukraine and Kazakhstan were all found to be statistically significant with an OLS regression. As illustrated in the map these countries additionally exhibit a high coefficient compared to the rest of the sample. As several of these countries are geographically located near each other there might be similarities between these countries that either affect the SIM effect, or that result in the countries affecting each other. In line with previous research our results suggest that the effect is stronger in particular regions and within certain market classifications (Degenhardt & Auer, 2018; Zhang & Jacobsen, 2021). This could indicate that neighboring countries, or markets with similar market classifications affect each other, which would violate the independence assumption of OLS regression.

5.2 Panel data regression

In order to account for interdependence among variables and country level heterogeneity eight panel data regressions with random effects have been carried out. The results are presented in this section where the statistical significance of the SIM effect is tested before we try to explain the anomaly with a country's market status classification, geographical region and score on Hofstede's cultural dimensions. Random intercept and random coefficient models have been applied for both objectives.

The first random intercept model tests whether the returns are different across countries and the results reveal a statistically significant p-value for the intercept. When including the level 1 predictors the SIM dummy exhibits a positive and significant effect on returns. When additionally including the level 2 predictors the variable remains significant and positive at the same magnitude. Moreover, the variable representing South America exhibits a positive and significant impact on returns.

When allowing the independent variables to have a different effect for each country in a random coefficient model the SIM effect remains positive and statistically significant. The market status developed and emerging are found to be significant at a 0.05 level with negative coefficients. The European region turns significant at the 0.1 level and the results reveal a negative impact on returns. The significance for the South American region decreases to the 0.05 level and the coefficient remains positive.

When including interaction effects between the SIM variable and the variables representing the country´s market status and region the significance of the SIM effect decreases to the 0.1 level. The main effect for the European region turns insignificant, however the interaction term with the SIM variable becomes significant with a positive coefficient, although only at a 0.1 level.

The main effect for South America increases in significance level while the interaction term becomes significant at the 0.1 level with a positive coefficient. The market status developed turns insignificant and emerging decreases in significance level to the 0.1 level.

Table 18: Panel data regression output for the random intercept model

	Model 1: Random intercept model				*Model 2: Adding level 1 predictors*				*Model 3: Adding level 2 predictors*			
	Coefficient	Standard error	t-value	p-value	Coefficient	Standard error	t-value	p-value	Coefficient	Standard error	t-value	p-value
Intercept	0.008211	0.002121	3.871	*** < 0.001	0.031290	0.022400	1.397	0.162	0.035250	0.022860	1.542	0.123
SIM	-	-	-	-	0.018050	0.002078	8.688	*** < 0.001	0.018050	0.002078	8.687	*** < 0.001
Developed	-	-	-	-	-	-	-	-	-0.007250	0.005699	-1.272	0.207
Emerging	-	-	-	-	-	-	-	-	-0.008648	0.005471	-1.581	0.118
Frontier	-	-	-	-	-	-	-	-	-0.004388	0.005710	-0.768	0.444
Europe	-	-	-	-	-	-	-	-	-0.002139	0.005892	-0.363	0.717
Asia	-	-	-	-	-	-	-	-	-0.000138	0.006782	-0.020	0.984
Middle East	-	-	-	-	-	-	-	-	-0.004712	0.007315	-0.644	0.521
North America	-	-	-	-	-	-	-	-	-0.001224	0.008767	-0.140	0.889
South America	-	-	-	-	-	-	-	-	0.036920	0.008910	4.144	*** < 0.001
Oceania	-	-	-	-	-	-	-	-	0.001095	0.014700	0.075	0.941
Marginal R2	0				0.0583415				0.0713803			
Conditional R2	0.0682990				0.1284526				0.1239223			

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1. The month and year dummies are excluded for readability. The variables rarely studied and Africa is omitted from the regression output as rank deficiency resulted in some of the variables becoming constants.

Table 19: Panel data regression output for the random coefficient model

	Model 4: Random coefficient model				*Model 5: Random coefficient model with interaction effects*			
	Coefficient	Standard error	t-value	p-value	Coefficient	Standard error	t-value	p-value
Intercept	0.042720	0.022660	1.885	0.059	0.039260	0.022710	1.729	0.084
SIM	0.017870	0.002251	7.939	*** < 0.001	0.009514	0.003743	2.542	* 0.012
Developed	-0.012160	0.004324	-2.813	** 0.006	-0.009563	0.004942	-1.935	0.057
Emerging	-0.013920	0.004364	-3.190	** 0.002	-0.011310	0.004786	-2.364	* 0.021
Frontier	-0.004305	0.004630	-0.930	0.355	-0.004625	0.005012	-0.923	0.359
Europe	-0.010050	0.004719	-2.130	* 0.036	-0.006184	0.005156	-1.199	0.234
Asia	-0.004633	0.005333	-0.869	0.388	-0.002500	0.005914	-0.423	0.674
Middle East	-0.005692	0.005890	-0.966	0.337	-0.005594	0.006407	-0.873	0.385
North America	0.000680	0.006513	0.104	0.917	-0.001326	0.007571	-0.175	0.861
South America	0.021810	0.007177	3.039	** 0.003	0.029980	0.007806	3.840	*** < 0.001
Oceania	0.002998	0.011290	0.266	0.791	0.001330	0.012750	0.104	0.917
SIM:Developed	-	-	-	-	0.005147	0.003282	1.568	0.121
SIM:Emerging	-	-	-	-	0.005655	0.003348	1.689	0.094
SIM:Frontier	-	-	-	-	0.000896	0.003577	0.250	0.803
SIM:Europe	-	-	-	-	0.008052	0.003629	2.219	* 0.029
SIM:Asia	-	-	-	-	0.004585	0.004083	1.123	0.264
SIM:Middle East	-	-	-	-	0.001446	0.004530	0.319	0.750
SIM:North America	-	-	-	-	-0.000154	0.004947	-0.031	0.975
SIM:South America	-	-	-	-	0.014220	0.005515	2.579	* 0.011
SIM:Oceania	-	-	-	-	-0.000711	0.008547	-0.083	0.934
Marginal R2	0.0692788				0.0725002			
Conditional R2	0.1299229				0.1269056			

Note: Significance level *** p<0.01, ** p<0.05, * p<0.1. The month and year dummies are excluded for readability. The variables rarely studied and Africa is omitted from the regression output as rank deficiency resulted in some of the variables becoming constants.

When including Hofstede's cultural dimensions in a random intercept model the SIM effect becomes significant at the 0.01 level with a positive impact on returns. The market status emerging remains significant at the same level with a negative coefficient. Additionally, South America remains significant however, at a lower significance level. The merely statistical relationship found in this model in terms of Hofstede's cultural dimensions is the dimension that measures Indulgence versus Restraint (IVR) which is found to be significant at the 0.1 level with a positive coefficient. This implies that a country's score on indulgence would have a significant and positive impact on returns.

When allowing the coefficients to randomly vary across countries in a random coefficient model the SIM effect and South America remains significant at the same levels as in the previous model. The market status developed turns significant at the 0.05 level while emerging becomes significant at the 0.01 level, both with negative coefficients. The cultural dimension Indulgence (IVR) turns insignificant as a result of the model specifications in the random coefficient model.

When additionally including interaction effects between the SIM variable and the cultural dimensions the results become highly interesting. The SIM effect turns insignificant, however the interaction with two of Hofstede's cultural dimensions are found to be statistically significant. The results reveal that the interaction term for both Indulgence (IVR) and Long Term Orientation (LTO) have a significant and positive effect on returns. Moreover, the main effect for Indulgence (IVR) is additionally found to be significant with a positive coefficient. However, all of the significant relationships concerning these two dimensions are significant at the lowest cutoff which is the 0.1 level. The market status developed and emerging remain significant at the same level which also applies for the region South America. Indicating that these market status classifications have a significant and negative impact on returns, while South America have a significant and positive impact on returns. The results from the panel data regressions imply that a country's score on Indulgence (IVR) and Long Term Orientation (LTO) could explain the SIM effect.

Table 20: Panel data regression output for the models including Hofstede's cultural dimensions

	Model 6: Random intercept model				*Model 7: Random coefficient model*				*Model 8: Random coefficient model with interaction effects*			
	Coefficient	Standard error	t-value	p-value	Coefficient	Standard error	t-value	p-value	Coefficient	Standard error	t-value	p-value
Intercept	0.009964	0.031820	0.313	0.754	0.032070	0.028250	1.135	0.257	0.020640	0.029380	0.703	0.483
SIM	0.020300	0.002367	8.577	*** < 0.001	0.020530	0.002593	7.917	*** < 0.001	0.004498	0.011970	0.376	0.709
Developed	-0.015850	0.008926	-1.776	0.080	-0.018390	0.006698	-2.746	** 0.008	-0.018560	0.006777	-2.739	** 0.008
Emerging	-0.018790	0.007600	-2.472	* 0.016	-0.020840	0.005900	-3.532	*** 0.001	-0.020810	0.005971	-3.485	*** 0.001
Frontier	-0.006477	0.007735	-0.837	0.405	-0.008444	0.006174	-1.368	0.176	-0.008334	0.006218	-1.340	0.185
Europe	0.000526	0.009948	0.053	0.958	-0.005984	0.007659	-0.781	0.438	-0.006916	0.007747	-0.893	0.375
Asia	0.004691	0.012440	0.377	0.707	0.002258	0.009388	0.241	0.811	0.002275	0.009494	0.240	0.811
Middle East	-0.006371	0.011780	-0.541	0.590	-0.010200	0.009256	-1.102	0.274	-0.010020	0.009340	-1.073	0.290
North America	-0.008008	0.013730	-0.583	0.561	-0.001433	0.009787	-0.146	0.884	-0.003188	0.009999	-0.319	0.751
South America	0.041040	0.012130	3.382	** 0.001	0.027080	0.009304	2.911	** 0.005	0.026210	0.009418	2.783	** 0.007
Oceania	-0.002080	0.017120	-0.122	0.904	-0.000948	0.013040	-0.073	0.942	-0.001915	0.013190	-0.145	0.885
PDI	0.000102	0.000181	0.564	0.574	0.000085	0.000132	0.643	0.523	0.000071	0.000151	0.469	0.641
IDV	0.000020	0.000205	0.094	0.925	0.000105	0.000151	0.695	0.490	0.000060	0.000164	0.364	0.717
MAS	0.000148	0.000138	1.079	0.285	0.000087	0.000010	0.869	0.389	0.000104	0.000114	0.913	0.365
UAI	-0.000020	0.000147	-0.138	0.891	-0.000033	0.000106	-0.313	0.756	0.000030	0.000117	0.227	0.821
LTO	0.000049	0.000137	0.356	0.723	-0.000090	0.000101	-0.890	0.377	0.000007	0.000110	0.066	0.947
IVR	0.000314	0.000146	2.153	* 0.035	0.000140	0.000108	1.262	0.212	0.000254	0.000119	2.131	* 0.037
SIM:PDI	-	-	-	-	-	-	-	-	-0.000002	0.000100	-0.023	0.982
SIM:IDV	-	-	-	-	-	-	-	-	-0.000075	0.000087	-0.860	0.394
SIM:MAS	-	-	-	-	-	-	-	-	0.000023	0.000073	0.323	0.748
SIM:UAI	-	-	-	-	-	-	-	-	0.000064	0.000066	0.969	0.337
SIM:LTO	-	-	-	-	-	-	-	-	0.000130	0.000063	2.055	* 0.045
SIM:IVR	-	-	-	-	-	-	-	-	0.000170	0.000079	2.161	* 0.035
Marginal R2	0.0863524				0.0793006				0.0830698			
Conditional R2	0.1389742				0.1410290				0.1408403			

Note: Significance level *** $p<0.01$, ** $p<0.05$, * $p<0.1$. The month and year dummies are excluded for readability. The variables rarely studied and Africa is omitted from the regression output as rank deficiency resulted in some of the variables becoming constants.

6 Interpretation and discussion

This section will interpret the result from the time-series regressions and the panel data regressions and provide a discussion of the findings. The section starts out by relating the results from this study to existing empirical evidence in academic literature. Moreover, a broader discussion based on the countries that have been proven to have a significant SIM effect in the OLS regression tries to find similarities between those countries´ scores on indulgence and Long Term Orientation. By identifying a potential relationship between the score of countries with a significant SIM effect one might obtain a deeper understanding of the anomaly. Theoretical and methodological implications of the findings is presented before the section closes with potential limitations to the study and suggestions for future research.

The OLS regressions reveal that after controlling for the January effect, 51.85% of the countries that exhibit a significant SIM effect are classified as developed markets, while 18.52% are denoted as emerging markets. As half of the countries are developed markets, the results can be said to be in compliance with previous research that reports a more pronounced SIM effect in developed markets (Bouman & Jacobsen, 2002; Zhang & Jacobsen, 2021). However, the percentage of emerging markets with a significant SIM effect is equal to the ones classified as rarely studied markets, which contradicts Zhang & Jacobsen (2021) who report a more pronounced SIM effect in emerging markets.

The results for the regions reveal that 73.33% of the European sample in the developed markets exhibits a significant SIM effect after controlling for the January effect. This is in compliance with findings from Zhang and Jacobsen (2021) that suggest a highly prevalent effect among the European countries in the developed markets. Additionally, Europe is found to be the region with the highest percentage of countries with a significant effect when considering both all the significant countries, and when comparing the regions. This applies for both model specifications and the region is considered to be robust to the January effect. The results for the European region is considered to be consistent with previous research as several studies document the existence of a strong SIM effect in the European countries (Bouman & Jacobsen, 2002; Carrazedo et al., 2016; Degenhardt & Auer, 2018; Dichtl & Drobetz, 2015). The results for the Nordic region vary where two of the countries are found to have a significant SIM effect in both model specifications, two countries illustrate an insignificant relationship in both models while the last country exhibits a significant SIM effect in one of the model specifications. Similarly, Curto and Oliveria (2016) detected a SIM effect in the Nordic region that was weaker compared to the European region as a whole because of higher summer returns.

For the Asian market, Lean (2011) found a significant SIM effect for Malaysia, China, India, Japan and Singapore regardless of the inclusion of a January effect. On the contrary, our result reveals an insignificant SIM effect for both India and Singapore. Furthermore, the SIM effect for China is found to be significant merely after controlling for the January effect which additionally results in the SIM effect for Malaysia becoming insignificant. The only finding that appears to be consistent with previous research on the Asian markets seems to be the insignificant effect for Hong Kong. However, these findings are based on model extensions with several time-varying volatility models. Empirical evidence based on an OLS model like the one applied in this study reveals a significant effect for only Malaysia and Singapore (Lean, 2011). Nevertheless, this does not increase the consistency of our findings to previous research as the SIM effect for Singapore is found to be insignificant and Malaysia only exhibits a significant SIM effect before controlling for the January effect. The opposite outcome applies for China that reveals a significant SIM effect after controlling for the January effect. This could be considered inconsistent with Guo, Luo and Zhang (2014), who provided strong evidence of a SIM effect in the Chinese stock market that was robust to the January effect. However, the significant relationship in this study is detected after controlling for the January effect. The SIM effect for Japan is found to be significant in both model specifications which is in compliance with Sakakibara, Yamasaki and Okada (2013) who report a significant SIM effect for Japanese stock market indices which was robust to a January effect (Degenhardt & Auer, 2018). However, our findings are based on the original SIM effect while Sakakibara, Yamasaki and Okada (2013) argue for the necessity for a shifted effect adjusted for the Japan markets seasonal return pattern. Since our result illustrates a significant SIM effect, it might not be necessary to adjust the months. Maberly and Pierce (2003) report a significant SIM effect for Japan that was found to disappear after the internationalization of the Japanese financial markets while our findings suggest an SIM effect over the whole sample period from 1965 to 2020. Zhang and Jacobsen (2021) concluded that the anomaly appears to be strong in Asian countries which can be said to be consistent with our findings as the region accommodates many of the countries with a significant SIM effect. The only region with higher percentages when considering both all the countries with a significant SIM effect and the comparison amongst regions are Europe.

Empirical evidence on the statistical significance of the SIM effect in the US market is inconsistent and contradictory. Bouman and Jacobsen (2002) detected a significant SIM effect in the US market that is reduced when controlling for the January effect. Moreover, Maberly and Pierce (2004) found a significant SIM effect that turned insignificant when controlling for outliers and the January effect. However, Galai, Kedar-Levy and Schreiber (2008) found a significant SIM effect only after controlling for outliers. While Haggard and Witte (2010) discovered a significant SIM effect after 1953 which was considered robust to outliers and the January effect. The results from the two OLS regressions in this study do not reveal a significant SIM effect for the United States regardless of the inclusion of a January effect, which contradicts most of the previous research on the US market. However, our model specifications apply an extended sample period until 2020 and Lucey and Zhao (2008) did argue that the SIM effect would not endure in the US equity market.

Like the results from the time-series regressions, the results from the panel data regressions both confirms and contradicts previous empirical findings and even contributes with some new ones. As previous research has applied OLS regression the findings highlighted in the literature review are based on this methodology. This could indicate that previous empirical findings might not be directly comparable to the results from the panel data regressions. However, the main empirical findings are included in order to shed light on the implications and contributions of this study.

The SIM effect for the market status developed is found to be significant in both the random coefficient models that only include main effects. Additionally, a significant relationship is found in the last model specification in the random coefficient model that includes main effects and interaction effects for Hofstede's cultural dimensions. All of the coefficients for the variable are negative which implies a negative impact on countries return. The market classification emerging is found to be significant in all of the random coefficient models with a negative coefficient. The interaction terms for both market classifications exhibit an insignificant relationship indicating that the variables developed and emerging cannot explain the SIM effect. The results reveal that both developed and emerging do exhibit a significant impact on a country's return which is consistent with previous research where a more pronounced SIM effect is found in developed and emerging markets (Bouman & Jacobsen, 2002; Zhang & Jacobsen, 2021). The coefficients for both are negative, which implies a negative impact on a country´ s returns. Relating this to the SIM effect this could imply that these market classifications contribute to lower returns during the summer which increase the SIM effect.

The SIM effect for South America is found to be significant in all the model specifications which contradicts previous research as this region is not reported to exhibit a more pronounced SIM effect compared to other regions. Zhang and Jacobsen (2021) did report a strong SIM effect in North America, however the findings from South America are not emphasized. The results reveal that South America has a significant and positive impact on a country's return and contributes to explain the SIM effect as the interaction term is significant. As previous research has not emphasized a more pronounced effect in this region, this could be considered a contribution to previous research and new empirical evidence.

The SIM effect for Europe is found to be significant with a negative coefficient in the random coefficient model implying a negative impact on a country's return. Additionally, the interaction term with the SIM effect in the random coefficient model was found to be significant however with a positive coefficient. The SIM effect for Europe is not found to be significant in any of the last three model specifications that includes Hofstede's dimensions. The results imply that the European region does have an effect on countries' returns and contributes to explaining the SIM effect which is consistent with empirical findings of a more pronounced SIM effect in European countries (Bouman & Jacobsen, 2002; Zhang & Jacobsen, 2021).

The aspiration for this study is that Hofstede's cultural dimensions might explain some of the SIM effect. Our results reveal a statistically significant effect for two of the dimensions, namely Indulgence (IVR) and Long Term Orientation (LTO). Both dimensions exhibit a significant and positive interaction term with the SIM effect in the random coefficient model, however merely at the 0.1 significance level. Indulgence (IVR) additionally has a significant and positive main effect in both the random intercept model and the random coefficient model that includes interaction effects. Long Term Orientation (LTO) is found to explain the SIM effect. However, it does not reveal a significant main effect on returns which contrasts to Aprayuda et al. (2021) who reported a significant effect on returns for Long Term Orientation (LTO). Additionally, they found a significant impact on returns for Power Distance (PDI), Individualism (IDV) and Uncertainty Avoidance (UAI) which are found to be insignificant in our results. Since Indulgence (IVR) was not included in the study from Aprayuda et al. (2021)

it is unknown whether the findings are aligned with previous research on this dimension. Amory (2016) included Indulgence (IVR) in the study of sin stocks and found a significant and negative impact on returns. However, this might not be directly comparable as sin stocks are assumed to possess other characteristics than regular stocks (Fabozzi, Ma, & Oliphant, 2008). Further, Amirhosseini and Okere (2012) argue that Power Distance (PDI), Masculinity (MAS) and Uncertainty Avoidance (UAI) seem to affect the investment behavior, which are all found to be insignificant in our results. However, the findings are consistent regarding an insignificant effect for Individualism (IDV) (Amirhosseini & Okere, 2012).

The results from the panel data regressions reveal that Indulgence (IVR) have a significant and positive impact on a country's return and that both Indulgence (IVR) and Long Term Orientation (LTO) can contribute to explain the SIM effect. Since there is no empirical evidence on Hofstede's cultural dimensions impact on the SIM effect, interpreting the results requires another approach. With the purpose of gaining a deeper understanding of why these dimensions reveal a significant and positive effect, the individual countries' scores on these two dimensions are plotted in figure 2, and 3. The aim is to detect a potential relationship between countries that are found to have a significant SIM effect in the time-series regressions and the two dimensions. Discussing similarities between countries' that score similarly on Indulgence (IVR) and Long Term Orientation (LTO) might contribute to additional knowledge on the characteristics of the SIM effect.

The maps indicate that the dimensions appear to have scores opposite of each other, meaning that a high score in Indulgence (IVR) often coexists with a low score on Long Term Orientation (LTO). There could be several explanations for this potential relationship, and some of them are introduced in this section.

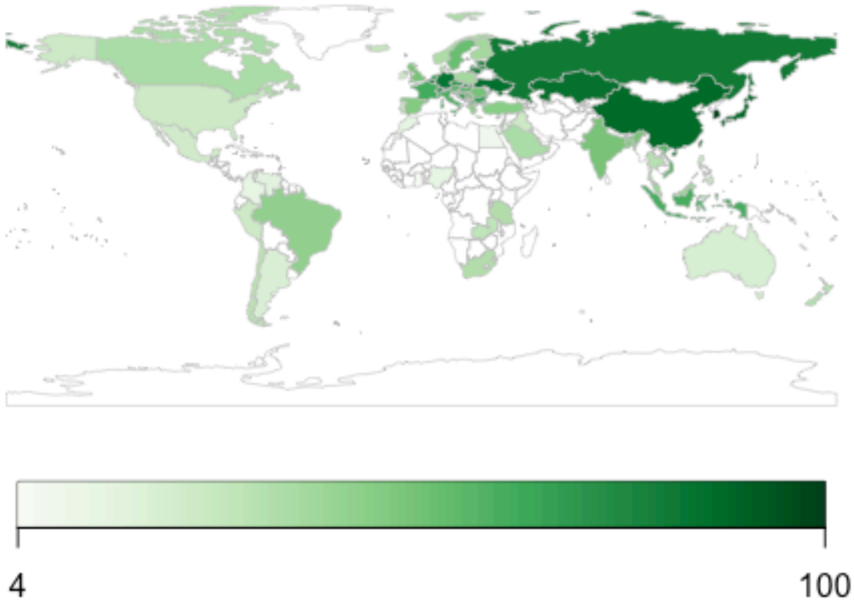

Figure 2: Long Term Orientation score across countries

Note: The map is created in the statistical software package R. Merely the 74 countries that have an available score on this dimension are included. Hong Kong is excluded from the map since it is not considered to be an independent country.

In the literature review, Long Term Orientation (LTO) was described as a dimension that denotes whether a society appreciates traditions and opposes societal change. A high score would entail that the society has a more pragmatic approach to change. The countries with a high score on this dimension are mainly countries that were previously part of the Soviet Union. It is not inconceivable that an authoritarian regime where a change of power has brought about major changes might have contributed to this score. Major changes can be said to have taken place in the society since Tsar Nicholas II was deposed as head of state until the fall of the Soviet Union in 1991, and the embrace of a partly capitalist economic system with a market economy. Another possibility is that societies in the former Eastern Bloc countries have been educated in communism and therefore have an impression that changes, which contribute to the greater good are more widely accepted. Other countries with a high score include the Asian countries China, Japan and Taiwan. These countries have also undergone major societal changes in the last 100 years, and have gone from traditional empires to one-party states, parliamentary democracy and republics. Two somewhat surprising countries that exhibit a high degree of Long Term Orientation (LTO) are Germany and Belgium. For Germany one could impose the same pattern of thought as the former Soviet countries. Germany has to a large extent over the past century gone from an empire to a republic, further to a dictatorship, before being divided between democracy and communism, and finally united in a parliamentary people's republic. Therefore, it can be said that the population has undergone major upheavals which in turn could have impacted the country´s score. Belgium on the other hand can be considered to have had a relatively stable socio-political historical development after the revolution of 1830, with two short disruptions caused by World War I, and II. An anchoring with the argument of political upheavals is therefore very weak. Belgium's location between two countries such as Germany and France in addition to Belgium's historical significance as a buffer state can be a factor that affects the high score on the dimension. It is therefore conceivable that countries where there have been consistent large changes over time, internal unrest or differences, and where the governance has been relatively authoritarian might have resulted in a population that to a greater extent is perceived as pragmatic to change.

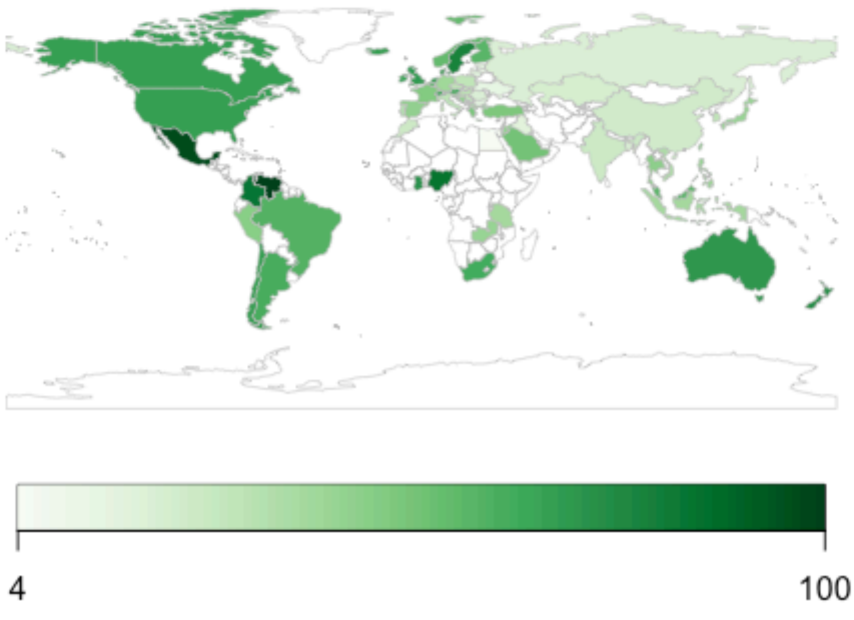

Figure 3: Indulgence score across countries

Note: The map is created in the statistical software package R. Merely the 74 countries that have an available score on this dimension are included. Hong Kong is excluded from the map since it is not considered to be an independent country.

The second significant dimension takes on Indulgence versus Restraint (IVR) and illustrates to what degree a society allows for a satisfaction of the member's needs. Indulgence (IVR) denotes a society that grants fairly free satisfaction of basic and natural human drives associated with appreciating life. Its opposite, Restraint denotes a society that suppresses satisfaction of needs and regulates it with rigid social norms. Again, one sees that the former Soviet states and China stand out, however here with lower scores. One could therefore question whether it is the same factors in the population that have had an impact, however with the opposite effect. The fact that the government over time has tried to shape the population towards productivity for the benefit of the government, might contribute to a population that to a lesser extent has been given the opportunity for self-realization on an individual level. It is interesting that both Italy and Portugal also have a relatively low score, however this could be seen in relation to a relatively high proportion of practicing Catholics where it is conceivable that religion may limit the score on Indulgence (IVR).

Panel data regression reveals that South America has a significant and positive impact on returns, however when looking at the individual countries in OLS regression merely Ecuador exhibits a significant effect. This might be because the countries have to a large extent been through the same political development and therefore the continent as a whole exhibits a significant effect and not the individual countries. The 20th century has involved several political and social changes in South America. From being dominated by European colonial powers to a greater degree of autonomy and eventually political influence from the US to once again becoming part of the power game during the cold war. This might have contributed to social unrest which several of the countries are still affected by. However, the differences in econometric models and model specifications might also contribute to explain this deviation. When looking at similarities in scores on Indulgence (IVR) and Long Term Orientation (LTO) between countries that are found to be statistically significant a pattern emerges. It appears that historical governance might contribute to unequal prerequisites for the population that are reflected in the cultural dimensions, which affects the SIM effect across markets.

The results from the study confirm the endurance of the SIM effect across markets which imposes a theoretical implication as it challenges the notion of market efficiency. Previous research has suggested that the anomaly additionally defies the conventional idea of a positive risk-return relationship which could entail another theoretical implication that challenges existing financial theory. As the SIM effect is found to endure and this study does not focus on the risk aspect of the anomaly further research should test whether the anomaly challenges the notion of a positive risk-return relationship. By utilizing panel data regression this study contributes to existing research by testing the SIM effect to new methodological specifications. Since several geographical regions appear to impact the SIM effect it would be very interesting if further research tested the phenomenon by applying spatial models.

Some of the variables were omitted because of rank deficiency in the data sample which led to unreported results for both the rarely studied markets and the African region. Another limitation to the study concerning the data sample is the reduction in the sample when including Hofstede's cultural dimensions. Merely the countries with available scores on all dimensions were included in the model which could introduce a bias. Neither the R squared for the time-series regressions, or the marginal and conditional R-squared for the panel data regressions was particularly high. This poses a limitation to the study as the portion of variance for the dependent variable that is explained by the independent variables are very low. However, this highlights how interesting the SIM effect is and confirms that there are still missing pieces of the puzzle.

7 Conclusion

Understanding anomalies is important in order to comprehend financial markets especially if they remain to exist and thereby challenge the notion of market efficiency (Khanh & Dat, 2020). Previous research has found a statistically significant SIM effect over time, which if persistent would defy established fundamental economic theory. By analyzing the SIM effect across 99 markets with two different econometric models this paper contributes with new empirical evidence on the anomaly.

Time-series regressions on each of the countries reveal that 30 countries exhibit a significant SIM effect that is reduced to 27 when controlling for the January effect. The effect appears to be more pronounced in developed markets, and geographically in the European and Asian region which is consistent with previous research. Panel data regressions allow us to test the anomaly while allowing for interdependence among variables and country level heterogeneity. The results verify that the SIM effect has a significant and positive impact on returns. Additionally, they reveal that the market classifications emerging and developed have a significant and negative impact on returns. South America is found to have a significant and positive impact on returns. Based on time-series regression and panel data regression we conclude that the puzzle remains and continues to defy economic gravity. These findings imply that the anomaly creates arbitrage opportunities in particular markets where investors can earn abnormal returns when selling their stocks in May and reinvesting in November.

As there seems to be no existing academic literature that is able to fully explain the phenomenon, this thesis attempts to explain it based on previous empirical findings. Panel data regression reveals that Europa and South America are found to significantly contribute to the explanation of the SIM effect. As countries' region and market classification appears to have an effect on returns and the SIM effect one might question whether these countries have some similar cultural characteristics which introduced the anomaly to Hofstede's cultural dimensions. This thesis provides evidence of Indulgence (IVR) having a significant and positive impact on returns. Additionally, both Indulgence (IVR) and Long Term Orientation (LTO) are found to have a significant interaction effect and can therefore explain the anomaly. These two cultural dimensions have contributed to new empirical evidence on the SIM effect, and Hofstede has provided us with a piece of the puzzle.

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Appendix

Table A.1: Score on Hofstede's cultural dimensions for the developed markets

Country	Power Distance Index	Individualism versus Collectivism	Masculinity versus Femininity	Uncertainty Avoidance Index	Long Term versus Short Term Orientation	Indulgence versus Restraint
Australia	38	90	61	51	21	71
Austria	11	55	79	70	60	63
Belgium	65	75	54	94	82	57
Canada	39	80	52	48	36	68
Denmark	18	74	16	23	35	70
Finland	33	63	26	59	38	57
France	68	71	43	86	63	48
Germany	35	67	66	65	83	40
Hong Kong	68	25	57	29	61	17
Ireland	28	70	68	35	24	65
Italy	50	76	70	75	61	30
Japan	54	46	95	92	88	42
Netherlands	38	80	14	53	67	68
New Zealand	22	79	58	49	33	75
Norway	31	69	8	50	35	55
Portugal	63	27	31	99	28	33
Singapore	74	20	48	8	72	46
Spain	57	51	42	86	48	44
Sweden	31	71	5	29	53	78
Switzerland	34	68	70	58	74	66
United Kingdom	35	89	66	35	51	69
United States	40	91	62	46	26	68

Table A.2: Score on Hofstede's cultural dimensions for the emerging markets

Country	Power Distance Index	Individualism versus Collectivism	Masculinity versus Femininity	Uncertainty Avoidance Index	Long Term versus Short Term Orientation	Indulgence versus Restraint
Argentina	49	46	56	86	20	62
Brazil	69	38	49	76	44	59
Chile	63	23	28	86	31	68
China	80	20	66	30	87	24
Colombia	67	13	64	80	13	83
Czech Republic	57	58	57	74	70	29
Egypt	70	25	45	80	7	4
Greece	60	35	57	100	45	50
Hungary	46	80	88	82	58	31
India	77	48	56	40	51	26
Indonesia	78	14	46	48	62	38
Malaysia	100	26	50	36	41	57
Mexico	81	30	69	82	24	97
Peru	64	16	42	87	25	46
Philippines	94	32	64	44	27	42
Poland	68	60	64	93	38	29
Russia	93	39	36	95	81	20
Saudi Arabia	95	25	60	80	36	52
South Africa	49	65	63	49	34	63
South Korea	60	18	39	85	100	29
Taiwan	58	17	45	69	93	49
Thailand	64	20	34	64	32	45
Turkey	66	37	45	85	46	49

Table A.3: Score on Hofstede's cultural dimensions for frontier markets

Country	Power Distance Index	Individualism versus Collectivism	Masculinity versus Femininity	Uncertainty Avoidance Index	Long Term versus Short Term Orientation	Indulgence versus Restraint
Bangladesh	80	20	55	60	47	20
Croatia	73	33	40	80	58	33
Estonia	40	60	30	60	82	16
Jordan	70	30	45	65	16	43
Kazakhstan	88	20	50	88	85	22
Lebanon	75	40	65	50	14	25
Lithuania	42	60	19	65	82	16
Morocco	70	46	53	68	14	25
Nigeria	80	30	60	55	13	84
Romania	90	30	42	90	52	20
Serbia	86	25	43	92	52	28
Slovenia	71	27	19	88	49	48
Vietnam	70	20	40	30	57	35

Table A.4: Score on Hofstede's cultural dimensions for rarely studied markets

Country	Power Distance Index	Individualism versus Collectivism	Masculinity versus Femininity	Uncertainty Avoidance Index	Long Term versus Short Term Orientation	Indulgence versus Restraint
Bosnia and Herzegovina	90	22	48	87	70	44
Bulgaria	70	30	40	85	69	16
Ghana	80	15	40	65	4	72
Iceland	30	60	10	50	28	67
Iraq	95	30	70	85	25	17
Latvia	44	70	9	63	69	13
Luxembourg	40	60	50	70	64	56
North Macedonia	90	22	45	87	62	35
Malta	56	59	47	96	47	66
Montenegro	88	24	48	90	75	20
Slovakia	100	52	100	51	77	28
Tanzania	70	25	40	50	34	38
Trinidad and Tobago	47	16	58	55	13	80
Ukraine	92	25	27	95	86	14
Venezuela	81	12	73	76	16	100
Zambia	60	35	40	50	30	42