
The relevance of the country and sector effect in global equity returns around COVID-19 and developed and emerging markets

Received (in revised form): 20th November, 2023

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Abstract This study explores the historical and current explanatory power of country classification and Global Industry Classification Standard sector classification on global equity returns in the equally weighted MSCI All Country World Index. R^2 is a crucial statistical tool for risk and portfolio management professionals because it serves as a measure of how much of a portfolio's movements can be explained by factors. Its significance lies in its ability to quantify how dependent a portfolio's risk is on those factors. The country classification's adjusted R^2 is dominant in global equities, driven by its dominance within emerging markets (EM). Within developed markets (DM), the country effect's slight dominance over the sector effect has decreased over time — the two have become more balanced since 2015, with the sector effect having a slightly higher adjusted R^2 value. There

was a drop in the R^2 for all classifications during the COVID-19 pandemic. This drop was most significant in the country classification, with a sharp decline to 8.3 per cent, well below its previous historical minimum of 12 per cent, before it rebounded to its historical range. This change drove further analysis into the country effect across EM and DM, where the large drop and rebound were primarily within EM. During this time, the sector effect dropped but remained within its historical range, implying a larger loss of diversification benefit in country effect than in sector effect. The impact of Chinese stocks on country effect within EM is also investigated. In 2018, there was a large influx of Chinese companies into the index, which caused a decline in country diversification and hence a reduction in explanatory power within EM. China's rapid and strict COVID-19 response, early tight monetary policy and regulatory crackdown have since caused it to become increasingly differentiated from the rest of EM, increasing country diversification within EM and causing the accentuated rebound in explanatory power of the country effect post-COVID-19. Risk managers can use these results to validate the use of sector and country classifications in portfolio construction.

Keywords: *GICS classification effect, country effect, diversification, portfolio construction, regression, emerging markets, China*

In loving memory of our dear colleague Francis Boateng-Frimpong

INTRODUCTION

Diversification improves the risk–return profile of financial portfolios, and a central point of academic investigation has been the driver of the effectiveness of international diversification. One side of the discussion states that international diversification benefits from differences in country-specific factors, such as local monetary and fiscal policy, differences in legal systems and access to credit and capital markets. These lead to a ‘country effect’. Conversely, international diversification may be primarily driven by an ‘industry effect’, which comes from differences in national industrial composition, as stated by Heston and Rouwenhorst.¹ The relative importance of the factors has significant implications for investors and risk managers. If the country effect is a bigger driver of return variation, diversification across countries is more effective in reducing portfolio risk. On the other hand, if industry factors are more important, diversification across industries will be more beneficial in managing the risk profile of a portfolio.

Heston and Rouwenhorst use categorical variables to study the importance of global, country and industry factors in equity returns and find that country diversification is more effective than industrial diversification. Papers by Serra,² Phylaktis and Xia,³ Menchero and Nagy,⁴ Norges Bank Investment

Management (NBIM)⁵ and Attig and Sy⁶ have come to similar conclusions when focusing on emerging markets (EM), indicating pure diversification by country to be more effective than pure diversification by industry in EM. NBIM find the role of the country effect in EM trends down over the 1975–2018 sample period, though the industry effect remains significantly smaller throughout the sample.

The temporal variation in the country and sector effect is a key point in the analyses by NBIM, Menchero and Nagy, and Attig and Sy. NBIM find that in developed markets (DM), the country effect tended to be larger than the industry effect over the full sample, in line with Heston and Rouwenhorst's findings. However, when compared to EM, DM's country effect is much smaller — half the size of EM. They also observe the more balanced roles of country and industry effects in the second half of their sample, reflecting an increased integration of countries within Europe and broader globalisation trends which caused a decline in the country effect. They also found an increase in the industry effect, though this seemed to be largely driven by the late 1990s stock market boom, concentrated in the information technology sector. Menchero and Nagy find a similar convergence between the country and sector effects in EM. Serra suggests a combination of the two axes is the best strategy for portfolio diversification in relation to these factors.

However, consensus has not been reached on the country effect's dominance. Cavaglia *et al.*⁷ found that

in the five years prior to the study, diversification across global industries provided greater risk reduction than diversification by countries. Brooks and Del Negro⁸ find that most variation explained by country effects is actually due to region effects. They also find that the industry effect is dominant in Europe. Attig and Sy found the industry effect to be larger in DM.

Attig and Sy's study focuses on the impacts of financial crises and economic shocks on international diversification, raising the point that during crisis periods markets exhibit negative co-movements and crash together; this is also discussed by Asness *et al.*⁹ and Viceira *et al.*¹⁰ Looking at the country and industry variances during these periods, Attig and Sy conclude that the benefits of overall diversification remain through these crises, such as the financial crisis and COVID-19. On COVID-19 specifically, they observed that country variance declined, whereas industry variance increased. Increased industry variance can be explained by the asymmetric impact on sectors; for example, business-related sectors such as hotels, restaurants and airlines were negatively affected, while IT, e-commerce and online streaming industries grew.

The primary aim of the research was to investigate the significance of country and sector effects in international diversification, extending previous research up to April 2022. The monthly dollar returns of each stock within the equally weighted MSCI All Country World Index (ACWI) were observed, looking at Global Industry Classification Standard (GICS) classification (level 1) effect and country effect on those stock returns.

A cross-sectional linear regression of each stock's return against categorical variables was run, which represents the categories the stock belongs to. Then it is possible to extract the adjusted R² which quantifies the explanatory power on the returns of this set of classifications. The adjusted R² is used to compare the explanatory power across classifications which have a significantly different number of variables, as is further explained in the data section. The regressions were run historically, starting from 2001 up to mid 2022, including in particular the COVID-19 period (pre and post). This then allows analysis of the levels of explanatory power as well as trends in explanatory power over time, paying particular attention to any drastic changes. Observations of the levels and changes in the

adjusted R² are used as a guide to steer further analysis, in an effort to understand the factors likely to drive the levels of explanatory power.

Policy implications for risk managers can be found under the heading 'Risk Management Implications'.

METHODOLOGY

For a given classification J — for GICS sector or country, for example — the analysis is based on the following cross-sectional regression:

$$R_i = \alpha_0 + \sum_{j \in J^-} \alpha_j D_{ij} + \varepsilon_i$$

where R_i is the dollar return of stock i and J^- represents the set of all categories in classification J, but without one of the categories. D_{ij} is a set of binary variables as explanatory variables: it equals 1 if stock i belongs to sector j (for example, if stock i is an energy company, $D_{i \text{ Energy}} = 1$ and all other sector variables are set to zero). The reason for one of the categories being removed is to avoid perfect multicollinearity and to make the regression feasible. The choice of the diminished category is made randomly and will be captured in the intercept α_0 . As this regression model contains only binary variables, it should be perceived as an ANOVA model. As pointed out by Heston and Rouwenhorst,¹¹ there is not a unique way of identifying country and industry effect and it is only possible to measure cross-sectional differences between categories for a given classification, which justifies the random choice of the category removed from the set J. α_j stands for some category-specific effect that impacts all stocks within the given category, but on this occasion it is pictured as differential intercept coefficients. Finally, ε_i is the residual of the regression for stock i . If a category-specific effect (for instance, the α_j) is a point of interest, then as pointed out by Heston and Rouwenhorst, not choosing an arbitrary country or industry as a benchmark but taking some equally weighted/market-cap market would be considered. However, the purpose of this paper is not to identify country-specific or sector-specific abnormal returns, in particular during the COVID-19 period or across regions. If interested, the reader should refer to Harjoto and Rossi,¹² Harjoto *et al.*¹³ and Sergi *et al.*,¹⁴ who have taken particular care over identifying this

for emerging and developed countries, with a closer look at the COVID-19 period.

The selected methodology is simply assessing the explanatory power of the country and sector driving factors of equity returns — their variability across time and across regional markets. Running this regression is the simplified and most efficient way to assess this. Eventually, returns adjusted to the market index may also be considered for the regression. Again, if the focus is only on the R^2 of the regression, then the full analysis remains the same and the impact is very much marginal.

DATA

The final sample size (data as of April 2022) is 2,929 companies, consisting of 50 countries and 11 sectors — distribution of the countries and sectors is visible in Appendices A and B. The initial step for analysis involved cleaning the data to ensure an accurate representation of the information. Within the MSCI ACWI dataset used, each company is assigned attributes equivalent to its real-world value, eg region and currency. Among these attributes are the ‘country code’ (domicile country) and ‘risk country code’ (country of highest risk exposure) — these countries can differ from each other for a given firm. By default, the raw data assigns the domicile country as the main country associated with each firm. Hence, the derived analysis is based on this country and on other country-dependent attributes, ie currency, region and EM/DM. However, there was a preference to consider the countries based on the risk exposure, so it was decided to use the risk country as the basis of analysis. Once each risk country was filled, the currency, region and EM/DM assignment were updated in the dataset based on the country.

Companies are separated into DM and EM buckets based on their risk country. The categorisation of DM versus EM is based on MSCI classifications.¹⁵

Given that the comparison is between classifications with vastly differing scales — eg 11 sectors versus 50 countries — the adjusted R^2 is analysed rather than R^2 . This is to ensure that any difference in explanatory power is not just due to more variables. When going from adjusted R^2 to R^2 , the country effect increases by 9 per cent and the sector effect increases by 6 per cent (data can be

provided upon request). Importantly, the overall trend for each effect remains the same.

GLOBAL CLASSIFICATIONS

The first step for analysis was the highest-level regression for the investment universe. Figure 1 shows the 12-month rolling average adjusted R^2 extracted from the regression of the monthly returns against the GICS sector and country classifications. This is also an opportunity to answer the same question for the following classifications: currency, region and GICS industry group (GICS level 2). The classification with the highest individual explanatory power is country, and it remains consistent throughout history, followed closely by currency. Country and currency are tied on a macroeconomic level, which explains the similarity.

The most notable feature on the chart is the significant drop in adjusted R^2 values for all classifications in 2020 and 2021, along with the fact that the relative magnitude of the decrease varies across the classifications. During this period, the GICS sector’s adjusted R^2 dropped 33 per cent, from 6.3 per cent to 4.2 per cent, which is well within its historical range. Its explanatory power has varied by around 5 per cent over the entire time period, indicating a consistent relevance over recent years.

For comparison, the explanatory power of the country variable had the biggest drop between September 2020 and September 2021, dropping 51 per cent, from 16.8 per cent to 8.3 per cent — well below its previous minimum value of 12 per cent in 2018. Considering its timing and the subsequent rebound back to its original levels, a likely explanation for this decline is the global impact of COVID-19. During the COVID-19 pandemic, global equity returns dropped due to the massive economic slowdown and uncertainty about the future. While this drop occurred in February/March 2020, the charted 12-month average produces a delay in the visible decline in adjusted R^2 . Figure A1 in Appendix C corresponds to the same analysis, but with a three-month rolling window, showing the decline in explanatory power starts in February–March 2020.

The drop in adjusted R^2 during this period demonstrates how COVID-19 was not

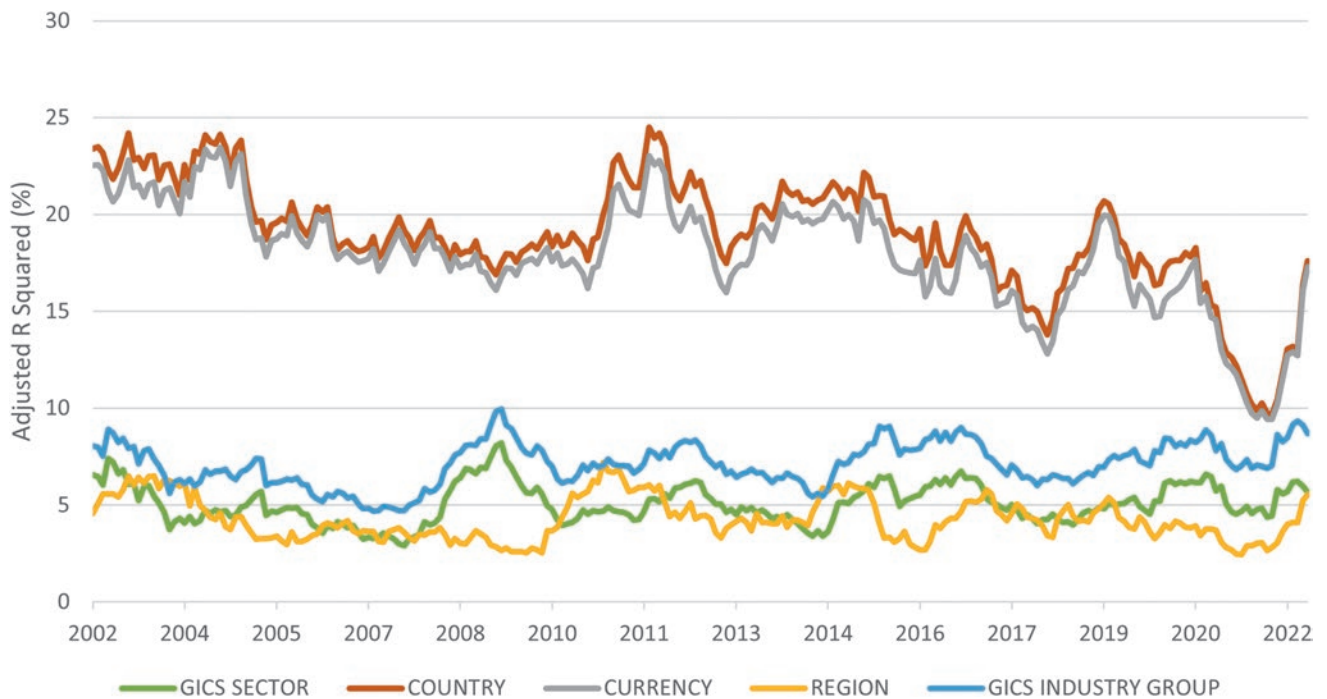


Figure 1: 12-month average adjusted R² of monthly returns against classifications

country-specific, with all stocks falling regardless of country. This means less returns diversification according to country, reducing the explanatory power of the country variable. The rebound in explanatory power to levels within its historical range also points to a non-persistent event causing the initial reduction. It does not suggest a long-term shift in the trend in the country effect.

The country effect's relative dominance in explanatory power suggests that (on a global average) it is the primary driver, after the market, of investment performance compared to the other classifications. This suggests that the country to which an equity belongs should be considered as a primary consideration in portfolio allocation when the investment universe spans numerous countries. However, it is useful to investigate the contribution of EM and DM to the country effect's global significance.

COVID-19 causing the country effect to exhibit a larger negative movement than the sector effect is a similar result to that found by Attig and Sy.¹⁶ During this period, country allocation suffered a larger drop in diversification than sector allocation, probably due to some sectors benefitting from the unique consumer circumstances caused by COVID-19,

where consumers were driven towards digital and e-commerce spending, as also pointed out by Attig and Sy. The sector effect's relatively consistent explanatory power also indicates it remains as useful a factor of diversification as it historically has been. It remains relevant for equity risk managers whose investment universe spans a number of sectors.

EM VERSUS DM

In this section, the investment universe is separated into stocks from EM and DM, comparing the magnitude and trends in country and sector effect in these regional markets.

Country effect comparison

Figure 2 shows the 12-month rolling average adjusted R² extracted from the regression of the monthly returns against country, separated into DM countries and EM countries. Comparing EM and DM, the country effect is much stronger in the former than the latter, though a general decline in EM can also be observed starting in 2017. The country dominance and decline observed in EM

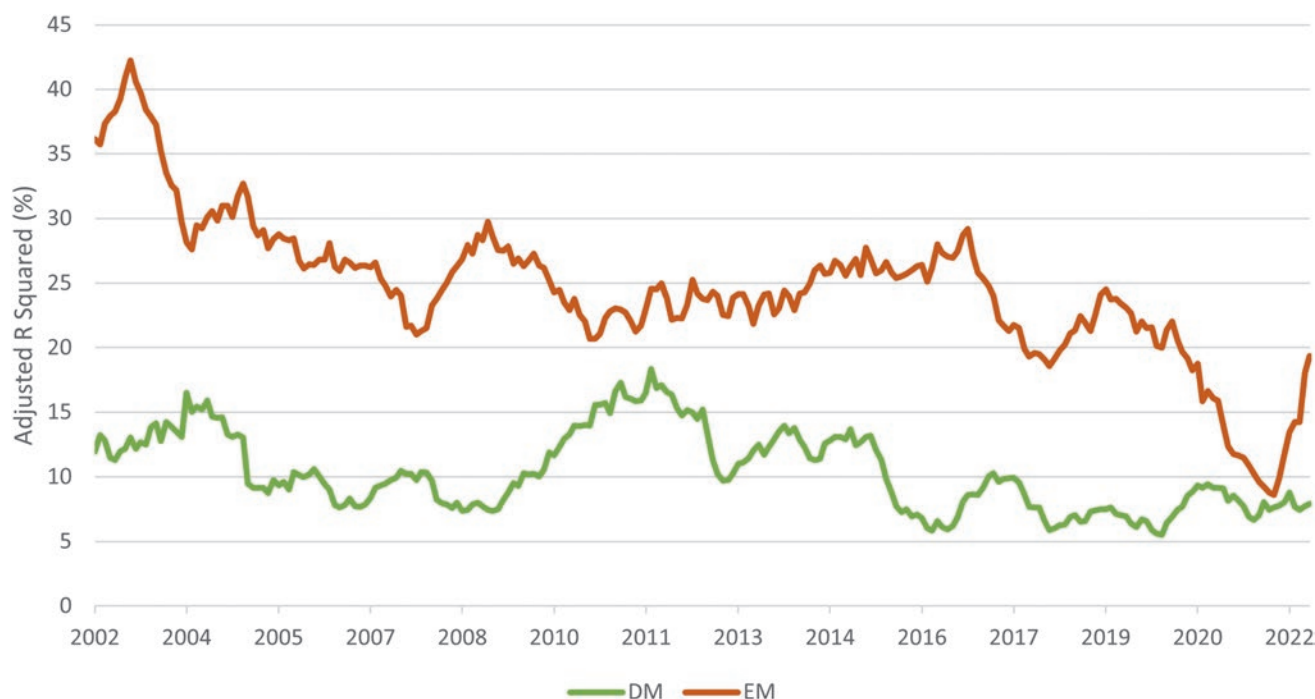


Figure 2: 12-month average adjusted R^2 of monthly returns against country – DM versus EM

versus DM are supported by NBIM¹⁷ and Attig and Sy.¹⁸ The weaker country effect in DM can probably be explained by the relative homogeneity of DM countries in terms of central banks, population and political drivers. On the other hand, EM is much more diverse across these factors, so policy impacts on country fundamentals are different for the same policy across different countries. Figure 2 highlights the importance of considering the country effect when managing risk in EM compared to DM. Funds with global/emerging market exposure should dedicate portfolio managers/analysts to specific regions/countries. This may help to better manage the idiosyncratic risks within that geography and to understand the combined risk on a portfolio level.

The COVID-19 drop in country effect from Figure 1 can be observed to be primarily due to a fall in a country's explanatory power in EM stocks. During times of financial crisis, EM economies are more susceptible to capital outflows than those in DM due to the desire of international investors to hold less risky assets. Investors are likely to sell their EM holdings regardless of the country of domicile, explaining this decline in EM country effect.

After the COVID-19 period, a rebound in the adjusted R^2 of the EM country effect can be observed. This is probably due to a combination of 1) strong commodities performance in 2021 and 2) EM central banks aggressively raising interest rates towards the end of 2021 to combat inflation. The commodities boom would have favoured EM commodities exporters, on balance making them more attractive than commodities importers. Inflation would have had varying impacts on EM countries, and the differing fiscal policies between them would have led to central banks increasing interest rates with varying levels of aggression. Both of these factors would have increased the importance of selectivity across EM countries for investors, hence increasing the diversification benefit across EM and the adjusted R^2 .

Sector effect comparison

Figure 3 shows the same regression as Figure 2, but with the cross sections of DM and EM with sectors. It can be seen that the sector effect has historically been slightly stronger in DM than in EM, especially in the latter half of the data. However, the difference

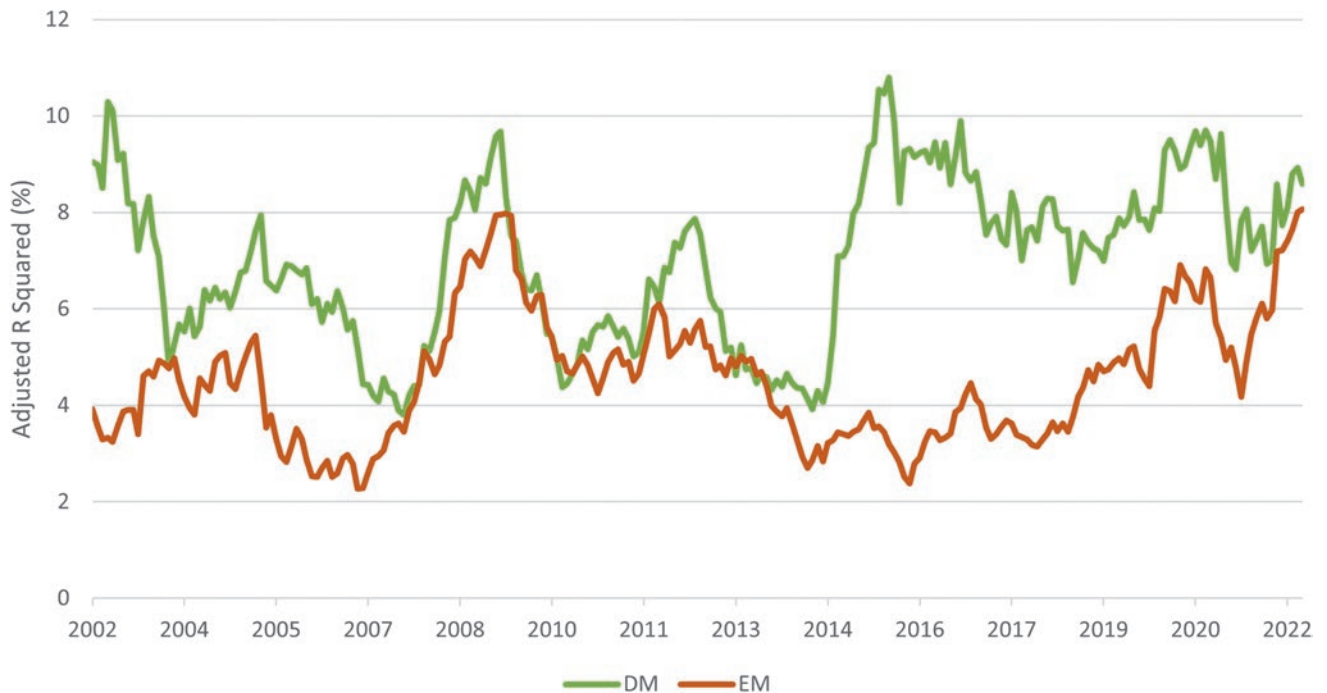


Figure 3: 12-month average adjusted R² of monthly returns against sector – DM versus EM

between EM and DM for sectors is very small (on the order of a couple of per cent) compared to EM’s much higher country effect compared to DM (Figure 2).

EM

Figure 4 shows a direct comparison between the country and sector effect within EM. Similar to NBIM¹⁹ and Attig and Sy,²⁰ the country effect is found to be significantly higher than the sector effect over the sample period. The findings suggest that when managing an EM portfolio, country selection historically has significantly more diversification benefits than sector diversification.

EM excluding China

Understanding the significant role China plays as an EM country, further investigation looked at how the EM country effect would look if Chinese stocks were excluded. Figure 5 shows the same as Figure 2, but removes all China-based stocks from the EM-based grouping. Removing China from EM shifts the country effect’s explanatory power upwards from

2017. Though there is still a decline in country effect in 2020, the floor is no longer a significant historical minimum, and the longer-term downwards trend disappears. Therefore, China is the source of the big reduction in the explanatory power of the country effect within EM, which enables the conclusion that the country factor is still relevant for risk management, despite globalisation. A question that can be raised is the impact of deglobalisation going forward — whether events such as company onshoring will increase the country effect.

A possible explanation for the large shift is the large influx of Chinese companies into the MSCI ACWI from 2018, causing China to have the most stocks in the index. During this time, China A Shares were added to MSCI indices due to an opening up of the economy under the Chinese vision of increasing globalisation. The Chinese market became more sophisticated and accessible, leading to the inclusion of its China A shares. Investment into Chinese companies had been rising prior to this point, and by 2018, Chinese companies made up ~30 per cent of the EM market cap. This means that a single variable explaining this large proportion of Chinese stocks

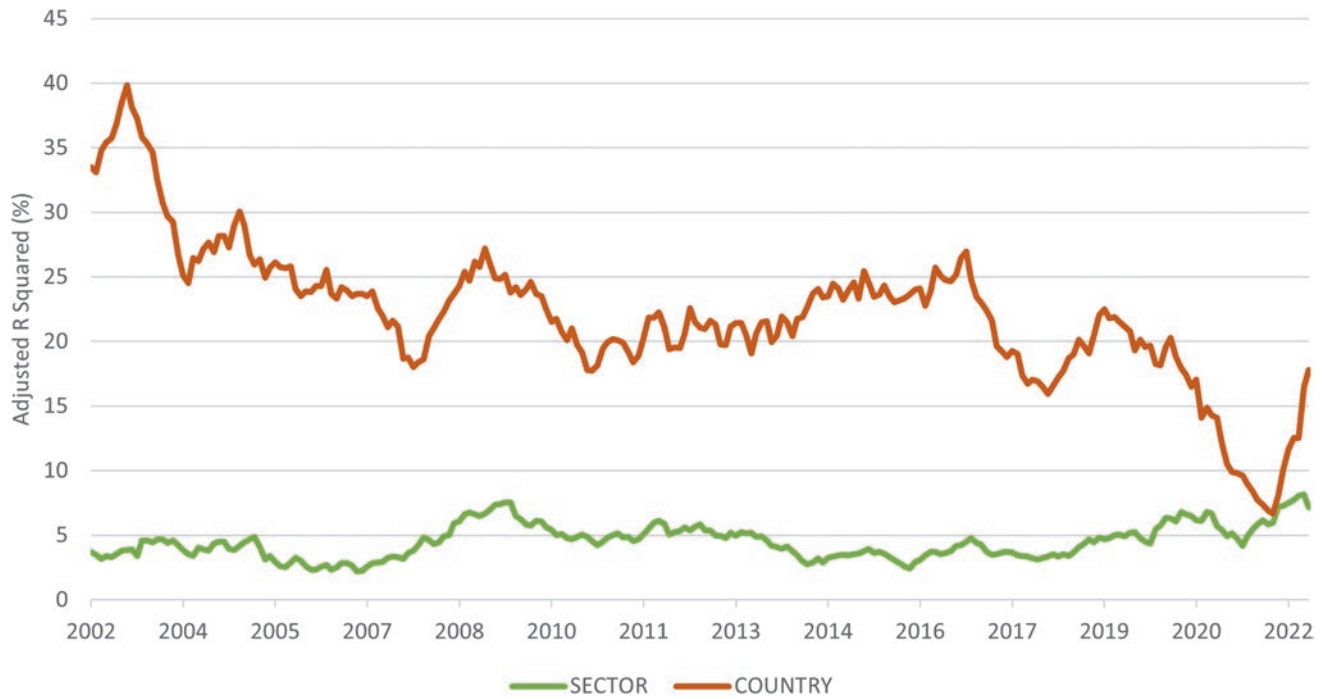


Figure 4: 12-month average adjusted R^2 of monthly returns against sector and country – EM

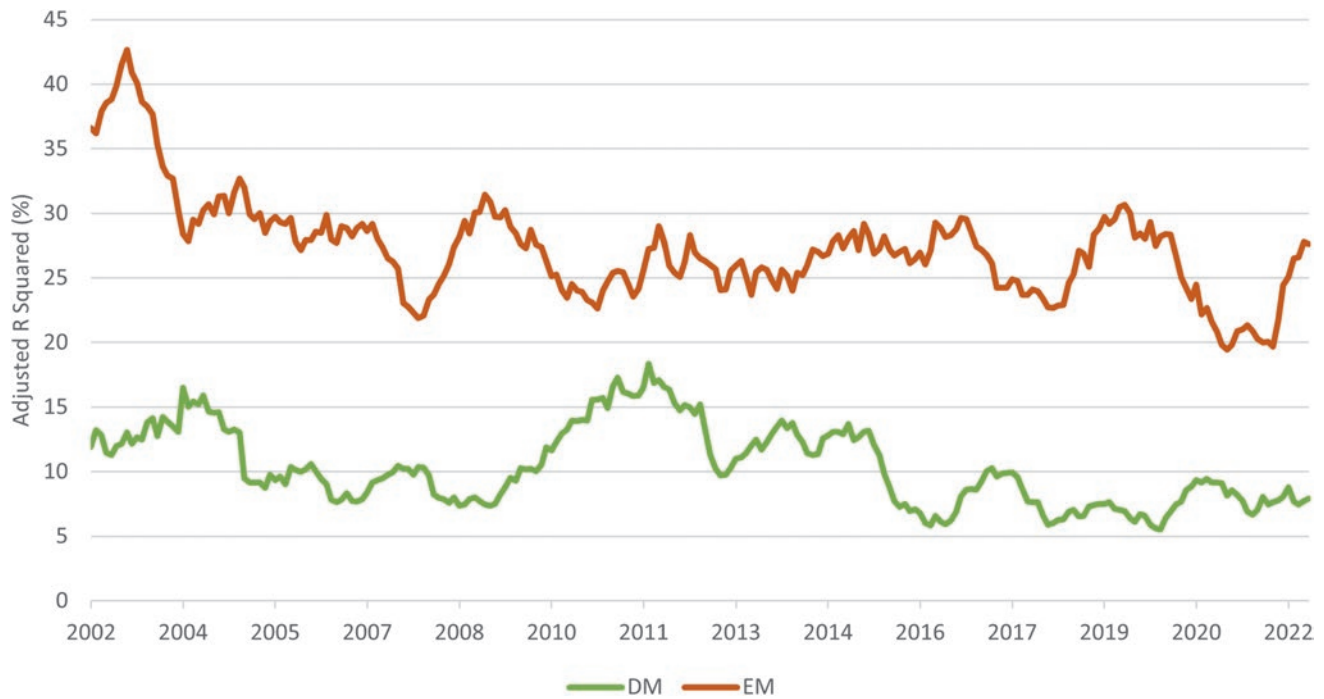


Figure 5: 12-month average adjusted R^2 of monthly returns against country – EM excluding China versus DM

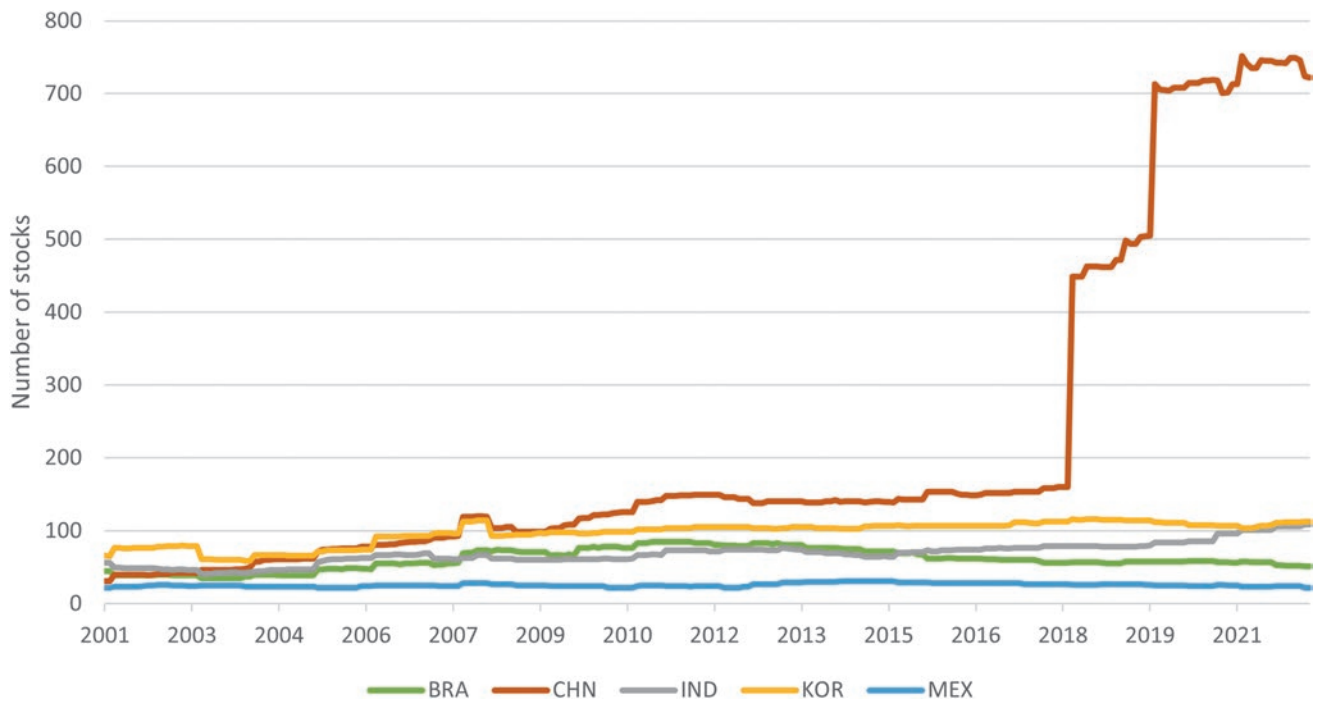


Figure 6: Top five countries with the highest number of stocks in the EM index

leads to a reduced country effect within the group of EM stocks, strengthening the country effect when China is removed. By July 2022, Chinese stocks made up 52 per cent of all EM stocks in the index by number. Figures 6 and 7 show that China’s contribution to the index is far greater than the next most common countries. China has more than double the number of stocks than the next four most prevalent countries — Korea, Brazil, India, and Mexico.

China decorrelation

Generally, China has been an outlier to other markets. An example of this is Figure 8, which shows the equally weighted volatility for China and the other major markets: the USA, Australia and Japan. China diverges from the other markets before and after times of turmoil. Pre and post the Global Financial Crisis, China had a higher volatility and the same applies for pre and post-COVID-19.

Figure 9 shows the correlation between the equally weighted daily average return of EM excluding China versus the same in China. Since COVID-19, the correlation between China and EM

excluding China shows a sharp decline and downward trend. A similar decorrelation can be observed between China and DM in this timeframe. During the same period, the EM excluding China and DM correlation experiences a smaller decline, but remains high and is moving upwards. This points towards an increase in diversification between China and the rest of EM (and DM), explaining most of the 2022 rebound in EM country effect visible in Figure 2.

China’s overall COVID-19 impact profile is different to many countries. China was the first country hit by COVID-19, they employed some of the most extreme COVID-19 measures and they were the first to recover. Their central bank adopted a tightening monetary policy at the end of 2020, which was earlier than the rest of EM and DM. China also engaged in a regulatory ‘crackdown’ on its tech, education and healthcare sectors in late 2020/early 2021, and in late 2021, China engaged in financial deleveraging of the real estate sector. These factors have led to China having totally different macro momentum and inflation dynamics to the rest of the world, possibly explaining the increase in

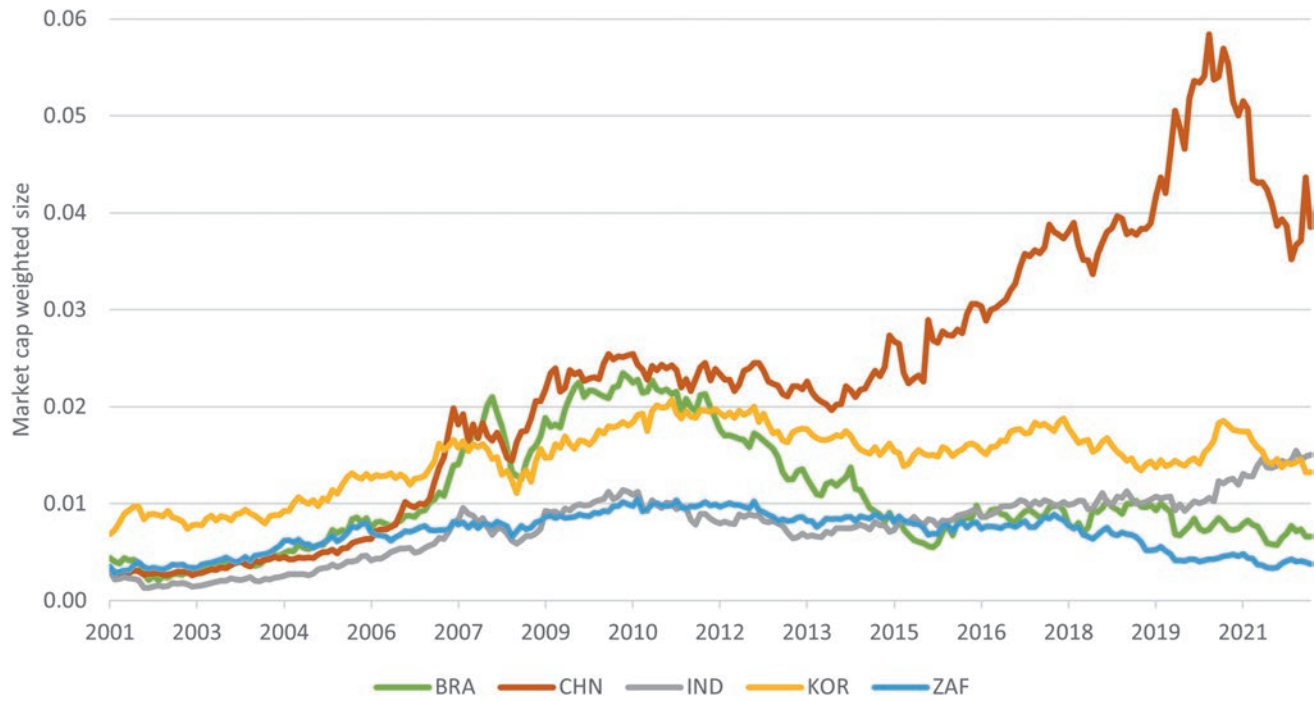


Figure 7: Top five countries with the highest market cap weighted size of stocks in the EM index

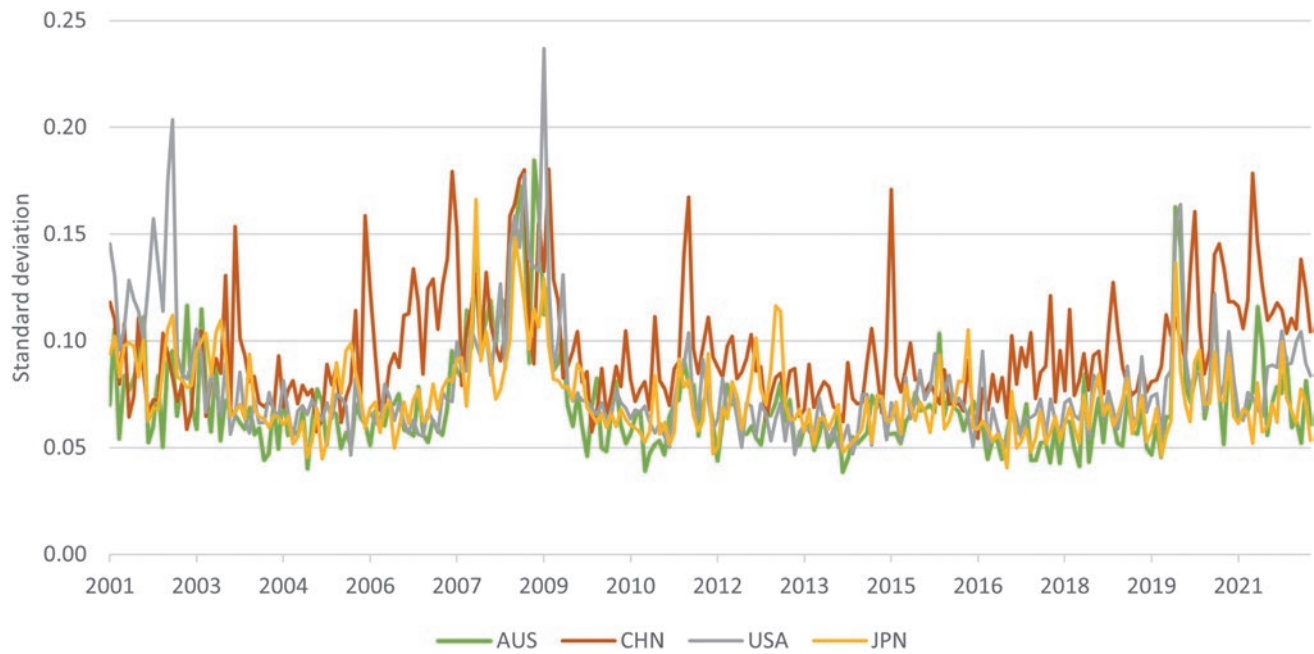


Figure 8: Historic standard deviation of major markets

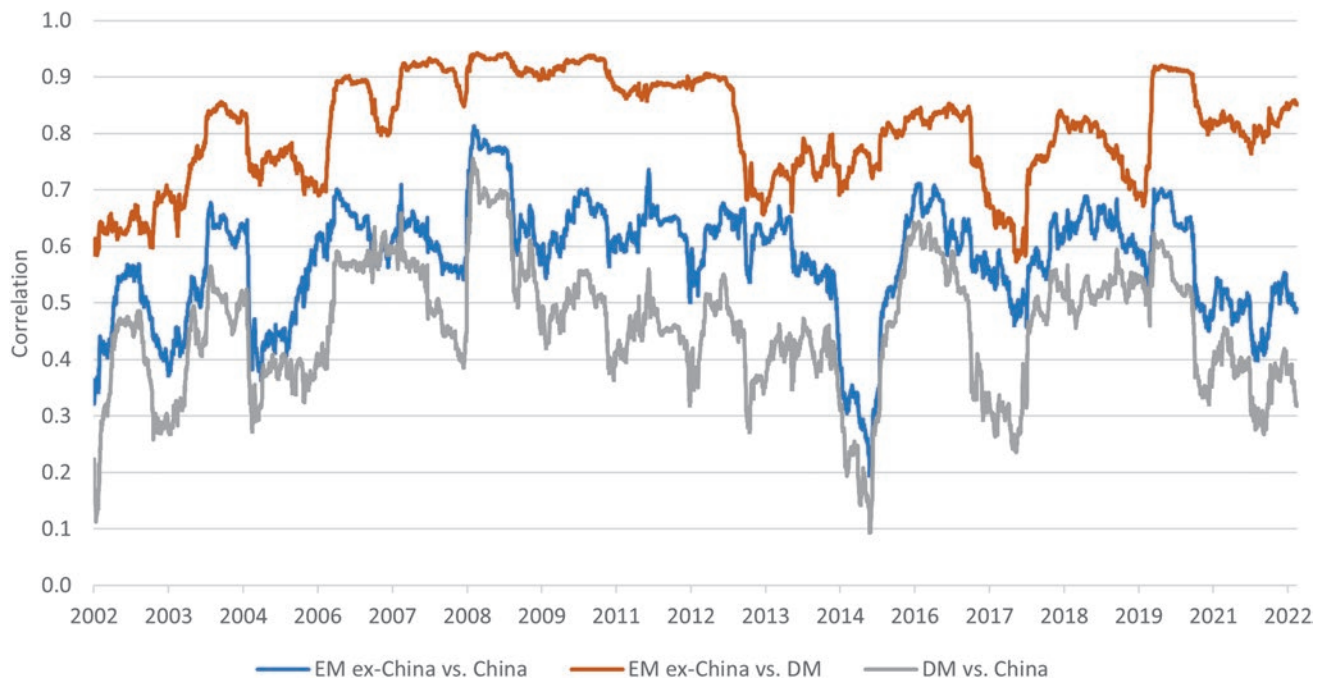


Figure 9: Average returns 12-month correlation of China, EM excluding China and DM

country effect post-COVID-19, as China became further differentiated from other countries. However, the likely biggest contributing factor to China's economic divergence post-COVID-19 was their zero-COVID policy. The policy stifled domestic consumption, manufacturing and travel,²¹ and the Chinese stock market steadily declined from its peak in 2021, while the rest of the MSCI ACWI index increased until the start of the Ukraine war. China relaxed their COVID-19 rules in November 2022, at which point their stock market rebounded.

Risk managers conducting their own analysis of country diversification benefits across EM should consider the impact of China's introduction to EM capitalisation, which diluted the diversification in EM between 2018 and 2020. During the COVID-19 period, risk managers would have been less concerned about the country risk due to the impact of the virus on global markets. Following this period, China's monetary and economic divergence increased the diversification within EM again. China's decorrelation from other geographies means it provides strong country diversification benefits through a low covariance. Risk managers would need to balance these diversification benefits with the

potential volatility from investing in Chinese stocks to find the optimal risk-return profile. Based on the efficient frontier theory, this could be done by testing a set of portfolios with varying allocation weights to find the allocation that maximises returns for the level of risk assumed. This would be the target allocation for the portfolio. Another perspective as a risk manager is to look at diversification in different market environments, considering the higher correlation between EM excluding China and DM in Figure 7 and their lower correlation with China. A risk manager would have a higher chance of maintaining more consistent returns from a market where both EM and DM are underperforming if they were to include Chinese stocks as a form of hedge in their portfolio due to the lower correlation.

DM

Looking at DM in Figure 10, the country effect tended to be slightly larger historically, until 2016, when the sector effect gained dominance, again as observed by NBIM.²² There is a changing dominance between country and sector effect over time and a far greater balance between the two when compared to

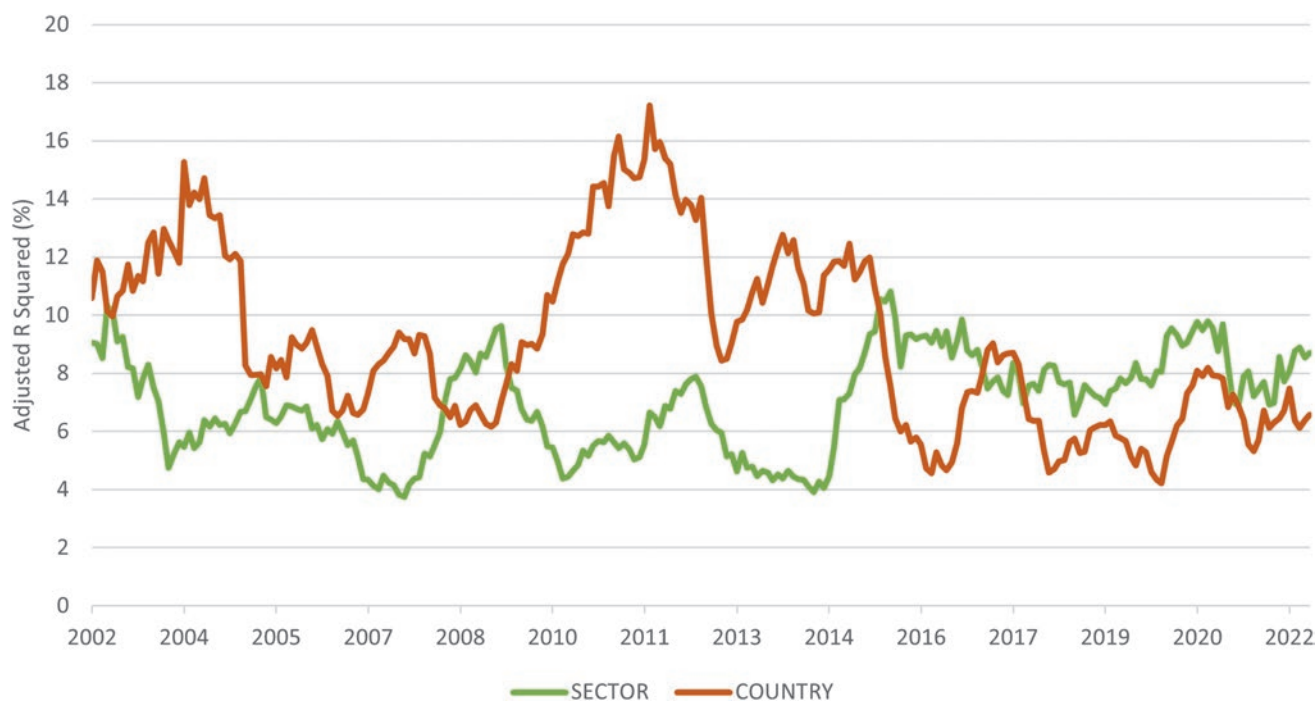


Figure 10: 12-month average adjusted R^2 of monthly returns against sector and country — DM

EM. With their data beginning in 1978, NBIM's sample size is larger than that of the authors, allowing them to observe longer-term trends in explanatory power, such as the decline in country effect. However, even on the smaller scale observed in this study, a similar trend is seen towards the end of this study's sample. The observations suggest that investors focused on DM stocks should give fairly equal attention to both country and sector allocation.

LOCAL CURRENCY

The stock returns are in dollars, producing a currency effect where the size of the local currency/USD FX conversion influences the size of the dollar returns. This impact is larger in geographies with weaker currencies relative to USD, many of these being in EM. To investigate the impact of this effect, the returns of each stock are converted back into the local currency of its associated country, thereby removing the currency effect. The regression is run again to observe if there are any significant changes in the explanatory power of the variables.

Figures 11–13 show that the trends observed are similar when local currencies are used. For the top-level classifications in Figure 11, using local currency reduces the R^2 of the country and currency variables by around 3 per cent and marginally increases the R^2 of the GICS sector, GICS industry group and region. Despite the small reduction in the country effect's dominance, the overall trend remains the same and the COVID-19 period drop and rebound are accentuated. Figures 12 and 13 show a similar story — slight changes in the size of the country effect but, the same overall trend. These results give us confidence that the conclusions drawn are not just due to a currency effect.

RISK MANAGEMENT IMPLICATIONS

Conducting a cross-sectional linear regression on historical MSCI ACWI monthly stock returns has allowed this paper to highlight changes in diversification regimes across global markets, DM and EM and to produce some possible suggestions about risk management through diversification, adding to previously found recommendations in

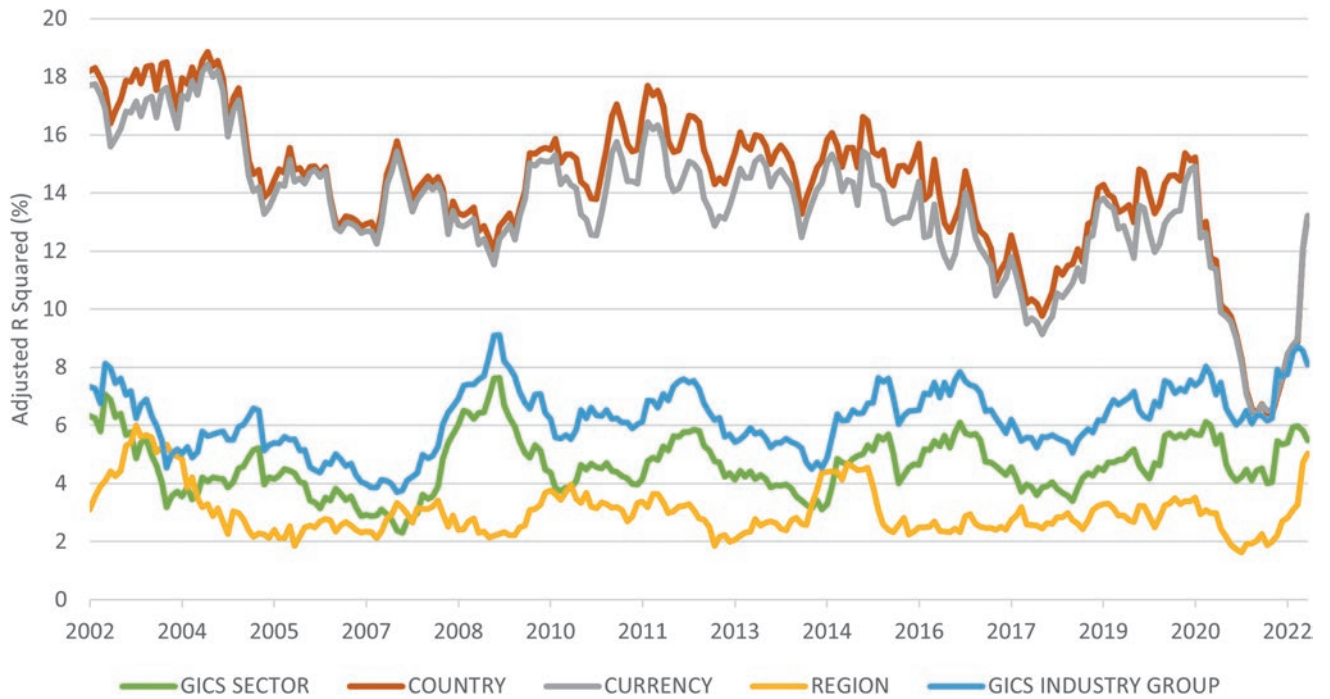


Figure 11: Local currency, 12-month average adjusted R² of monthly returns against classifications

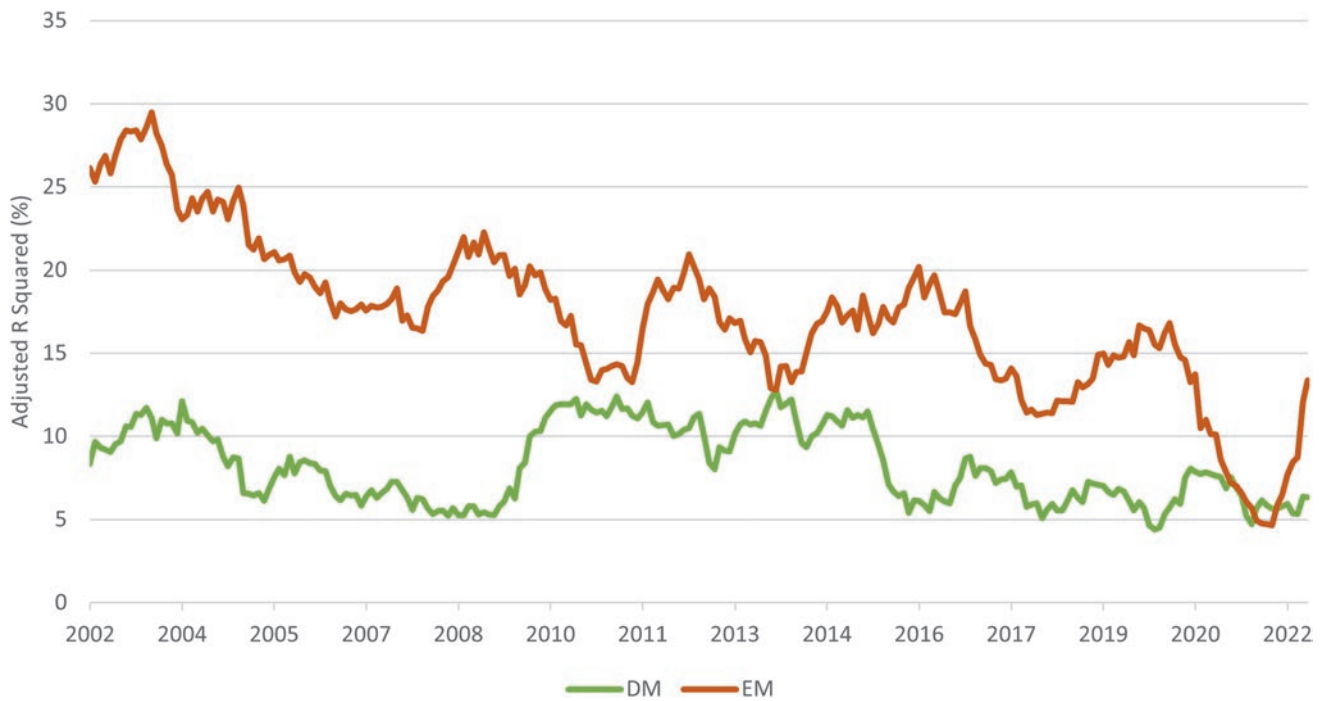


Figure 12: Local currency, 12-month average adjusted R² of monthly returns against country – DM versus EM

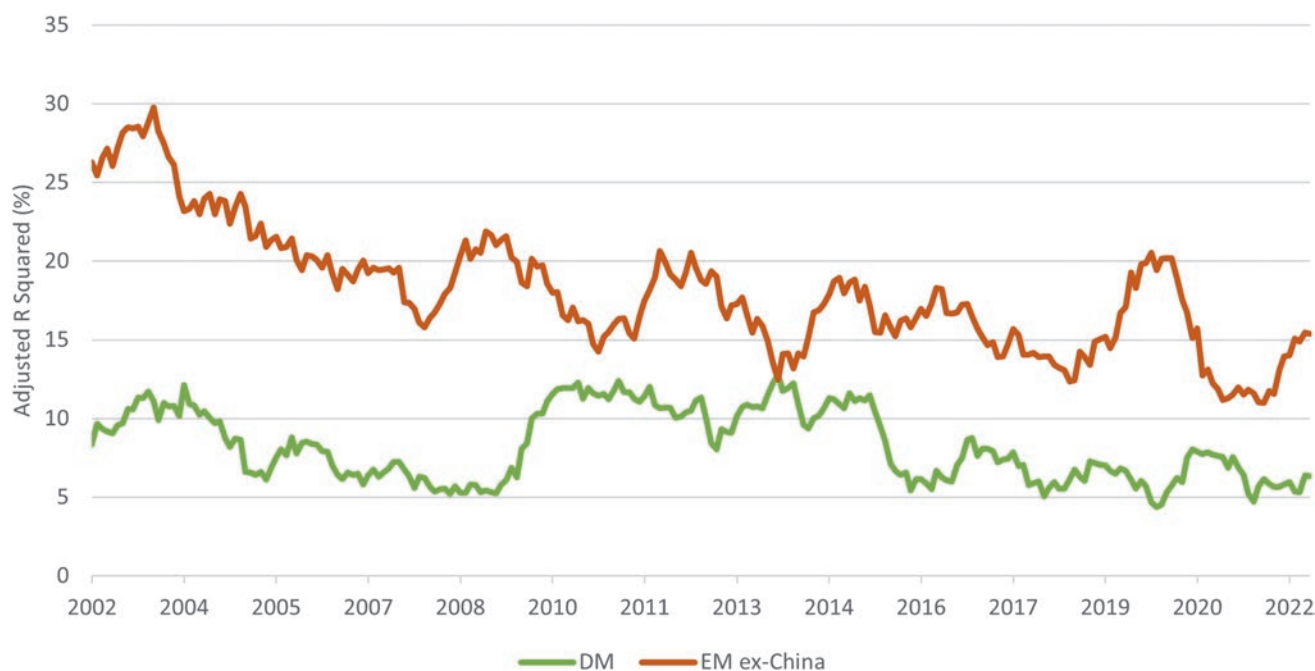


Figure 13: Local currency, 12-month average adjusted R^2 of monthly returns against country — EM excluding China versus DM

academic literature. For investors, R^2 explains how much the performance of an investment is explained by the performance of a benchmark, such as an index. A higher value of R^2 , closer to 1.0, suggests it has greater power as a forecasting tool for the performance of a fund or portfolio. However, here, given the simplicity of the regression, things may be formulated slightly differently: R^2 represents the portion of variability of belonging to a given country in the cross-sectional returns, which shows how this drives those returns from a risk management perspective. Using the adjusted R^2 as a proxy for explanatory power makes it possible to see which variables have driven the monthly returns historically. Therefore, high explanatory power for a variable validates its analysis in the portfolio risk management process.

When managing the risk in a global equity portfolio, country effect should be taken as the primary mode of diversification, even after COVID-19. Figure 1 shows that there is a high explanatory power of the country effect relative to all other measured variables, highlighting the impact that country-specific risk has on stock returns. However, similar to the conclusion drawn by Serra,²³

the findings suggest that a risk management strategy that also incorporates industrial diversification is optimal, based on its consistent significance historically. Figure 1 also shows that COVID-19 produced a local break in the explanatory power of the country effect that was much larger than the remainder of the variables. This is probably due to the deglobalisation impacts of COVID-19. All countries had an increased correlation with each other, with all stocks falling regardless of country. This brings to light the difficulty asset managers would have had in allocating risk along the country dimension during this time. It can be observed that COVID-19 did not produce a structural break in the country effect due to the post-COVID-19 rebound observed — risk allocation via country has returned to within its historical range and remains relevant.

The primary mode of diversification should be revisited regularly as the market changes, especially during times of financial stress. The findings show, as Attig and Sy²⁴ and NBIM²⁵ have observed, that there is a temporal variation in the benefits of diversification. There was a significant shift during COVID-19, which caused negative co-movement in country returns, reducing the diversification benefit across

countries. However, depending on the nature of the crisis, the relationship will change in different ways — the financial crisis caused country effect to increase more than industry effect, according to Attig and Sy.

When managing risk in an EM portfolio, country effect should be taken as the primary mode of diversification. Breaking the country effect into EM and DM in Figure 2 reveals that country-specific risk is significantly more important in EM than DM. It is essential that risk takers consider this risk when they have exposure to these countries. Diversity in geopolitical, economic and population factors increases the idiosyncratic risk when compared to the relative homogeneity of DM. As such, a possible recommendation is for investors with exposure to EM to dedicate increased resources to understanding the local dynamics of these geographies by, for example, dedicating analysts/portfolio managers to focus on these areas specifically.

When managing risk in a DM portfolio, both country and sector effect should be considered highly. Sector explanatory power exceeded country effect within DM around 2015, though the two levels remain close, suggesting risk managers should consider the two almost equally within this type of geographical portfolio.

Chinese stocks can be used to further diversify a global equity portfolio. Figure 2 shows a decline in the country effect's explanatory power over time in EM. Further investigation reveals that this is due to the inclusion of China in EM. The increasing investment in Chinese stocks, as well as the increasing number and market cap weighting of Chinese stocks in the index, decreased the explanatory power of country-specific variables in EM significantly between 2018 and 2020. However, Chinese divergence during and post-COVID-19 has caused them to further decorrelate from the rest of EM and DM, causing a subsequent rebound in the explanatory power of the country effect again. This signifies some strong country diversification benefits from holding Chinese stocks in the portfolio.

CONCLUSION

This paper has investigated whether country allocation or sector allocation is the primary driver of the benefits of international diversification. Running

a linear regression of the MSCI ACWI stock return versus GICS sector, country, currency, region and GICS industry group allowed exploration of the explanatory power of these classifications. Understanding the explanatory power made it possible to draw conclusions about the diversification benefits of the sector effect and country effect on portfolio construction.

The findings suggest that the country effect should be used as a primary method of diversification for a global equity portfolio as well as an EM-focused portfolio. This is due to the significantly higher adjusted R^2 . However, some consideration of sector allocation to optimise portfolio risk is probably wise. For DM-based portfolios, a more balanced consideration of country and sector allocation may be required due to their similar levels of adjusted R^2 . These recommendations consider the structural break in country effect that was observed during COVID-19 and the subsequent recovery to pre-COVID-19 levels. The structural break could be seen in the large dip in adjusted R^2 in 2020 due to the universal nature of COVID-19 as a cause of global stock decline. It is crucial that risk managers consider how the country and sector effects may be changing over time, especially during periods of market stress. How the diversification benefits of country and sector will change during these periods depends heavily on the particularities of the respective market event — the range of countries and sectors that exhibit co-movement and in which direction.

China is a notable outlier within DM and EM. First its inclusion in the MSCI index has caused massive reductions in country effects. Secondly, and most recently, China has positioned itself as a major decorrelated player, given its fiscal and political divergence during COVID-19 and, post-COVID-19, its economically restrictive zero-COVID policy, which has caused further decorrelation with EM and hence an increase in the EM country effect. Based on this decorrelation, risk managers looking to reduce global equity portfolio risk through international diversification may want to include China in their portfolios. Despite the volatility of Chinese stocks, assigning the correct allocation should reduce the overall variance of the portfolio. The inclusion of these stocks could act as a hedge during periods where both DM and EM excluding China are underperforming.

APPENDIX A

Country	Frequency	Country	Frequency
Argentina	9	Luxembourg*	1
Australia*	59	Macao*	2
Austria*	6	Malaysia	35
Belgium*	11	Mexico	24
Brazil	52	the Netherlands*	23
Canada*	84	New Zealand*	7
Chile	12	Norway*	10
China	749	Peru	3
Colombia	5	Philippines	19
Czech Republic	3	Poland	16
Denmark*	18	Portugal*	3
Egypt	3	Qatar	12
Finland*	12	Saudi Arabia	35
France*	67	Singapore*	19
Germany*	59	South Africa	35
Greece	6	Spain*	19
Hong Kong*	29	Sweden*	42
Hungary	3	Switzerland*	38
India	106	Taiwan	84
Indonesia	23	Tanzania	1
Ireland*	5	Thailand	42
Israel*	12	Turkey	11
Italy*	25	United Kingdom*	80
Japan*	260	USA*	637
Korea*	112	Zambia	1

Distribution of countries across the MSCI ACWI universe in April 2022. DM countries are marked with an asterisk²⁶

APPENDIX B

Sector	Frequency
Consumer discretionary	313
Consumer staples	240
Energy	102
Financials	463
Health care	274
Industrials	432
Information technology	363
Materials	286
Real estate	152
Communication services	169
Utilities	135

Distribution of sectors across the MSCI ACWI universe in April 2022

APPENDIX C

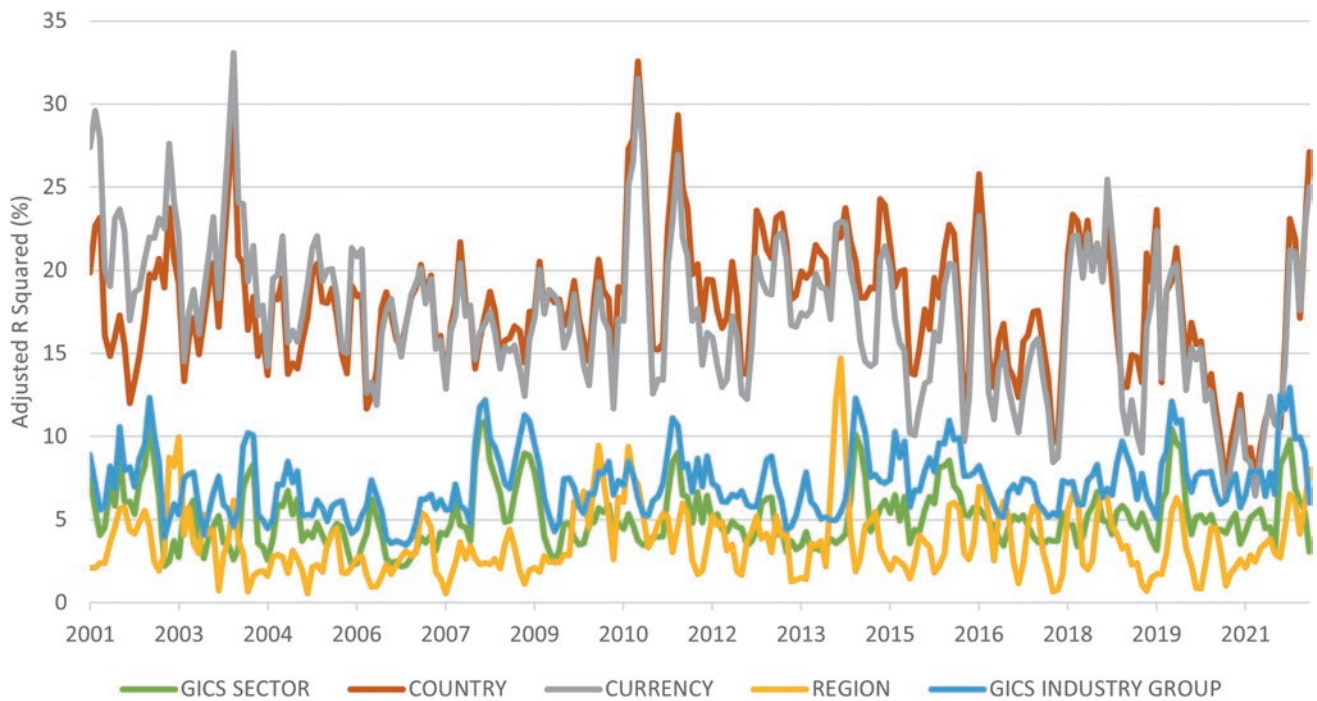


Figure A1: Three-month average adjusted R^2 of monthly returns against classifications

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