ZHAW School of Management and Law

The Key Drivers of Emerging Market Equity Returns

Master's Thesis

Master of Science (MSc) ZHAW in Banking and Finance
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Management Summary

This master's thesis focuses on identifying the key determinants of emerging markets (EM) equity returns using country indices. The study incorporated a total of six fundamental, five macroeconomic, and five technical and sentiment indicators to detect potential predictors of EM equity index returns. In a first step, Mean group (MG) estimation and pooled ordinary least squares (POLS) regressions were conducted to identify significant variables over various sample periods. In a second step, a backtesting strategy covering the period from 2013 to 2022 with quarterly rebalancing was performed to assess the predictive power of the identified significant variables.

Among the portfolio variants, those with long positions in countries ranked in the top quintile of fundamental indicators delivered the highest total returns. The POLS long portfolio, consisting of countries with top quintile scores in all six fundamental indicators (price-to-earnings ratio, price-to-book ratio, earnings per share, dividends per share, return on equity, and price-to-sales ratio) generated annualised returns of 10.48%, significantly outperforming the MSCI Emerging Markets Index, which returned 2.36% per year. When short positions for countries in the bottom quintile of the six fundamental variables were included to form a long-short portfolio, annualised returns fell to 8.1%. However, the inclusion of short positions considerably improved the Sharpe ratio from 0.496 in a long only portfolio, to 1.226 in the long-short variation.

In contrast, portfolios with long positions in countries ranked in the top quintile of macroeconomic and technical indicators failed to capture the relationship for consistently higher returns or even underperformed the benchmark. The results suggest that fundamental indicators are superior predictors of three-month forward returns for EM equities compared to macroeconomic and technical indicators, which is consistent with the existing literature.

Practitioners in the field of EM equity investment can derive practical implications from this study. Emphasising on fundamental indicators in the investment decision-making process is crucial, as they have shown greater explanatory power for future returns. A straightforward approach could involve employing a scorecard methodology to rank EM countries based on the six significant fundamental factors: price-to-earnings ratio (PE), price-to-book ratio (PB), return on equity (ROE), earnings per share (EPS), dividends per share (DPS), and price-to-sales ratio (PS). By assigning appropriate weights and directions to these factors, practitioners can identify countries with strong fundamental characteristics that generate higher risk-adjusted investment returns. While macroeconomic and technical analysis should not be disregarded entirely, their relative importance in the investment decision-making process should be weighted lower.

In conclusion, this study underscores the significance of fundamental indicators in driving EM equity returns and offers practical guidance for practitioners. By adopting a country selection approach that prioritises fundamental factors, practitioners can potentially enhance their investment strategies and achieve superior performance in EM equity markets.

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List of Abbreviations

ADF ..... *Augmented Dickey–Fuller test*
CAI ..... *Goldman Sachs current activity indicator*
CMD ..... *Citi commodities terms of trade index*
CPI ..... *Consumer price index*
DM ..... *Developed markets*
DPS ..... *Dividends per share*
EM ..... *Emerging markets*
EPS ..... *Earnings per share*
ESPR ..... *Citi economic surprise index*
GBS ..... *Government bond spread*
IP ..... *Industrial production*
MA ..... *Distance from the 200-day moving average*
MBR ..... *Market breadth*
MG ..... *Mean group estimation*
MSCI ..... *Morgan Stanley Capital International*
OLS ..... *Ordinary least squares regression*
PB ..... *Price-to-book ratio*
PE ..... *Price-to-earnings ratio*
PMG ..... *Pooled mean group estimation*
POLS ..... *Pooled OLS regression*
PS ..... *Price-to-sales ratio*
ROE ..... *Return on equity*
RSI ..... *Relative strength index*
TA ..... *Technical analysis*
TB ..... *Trade balance*
VIF ..... *Variance inflation factor*

1 Introduction

1.1 Background and Problem Definition

In search of new opportunities, superior returns, and diversification benefits, investors shift their attention to equities in emerging markets (EM). A combination of factors, including higher economic growth rates than developed markets, favourable demographics, technological advances, and rising consumer spending as the middle class expands, all contribute to the appeal of emerging markets. The asset class is additionally supported by China's economic recovery, after lifting the COVID-19 restriction in late 2022. In early January 2023, the Institute of International Finance reported that daily cross-border flows from foreign investors into emerging market assets were at their second-highest level in 13 years (Wheatley, 2023).

However, despite these positive factors, EM equities have had a weak performance over the past decade. The Morgan Stanley Capital International (MSCI) Emerging Markets Index, which tracks over 1,300 large- and mid-cap stocks in 24 EM countries, had an annualised return of 1.8% from 2012 to 2022. In contrast, the MSCI World Index, which includes 1,500 large- and mid-cap stocks from 23 developed markets (DM), has returned 9.5% per year. The considerable underperformance of EM equities raises questions about the factors influencing EM equity returns and the ability to predict their performance.

It is important to recognise the large dispersion in equity performance across EM countries, as displayed in Figure 1. This underlines the need to understand the drivers of returns at the country level. The International Monetary Fund (International Monetary Fund, 2014, p. 118) has emphasised the heterogeneity of emerging economies by ranking 16 EM countries on six aspects of economic and structural features. Each country in the MSCI EM index has unique characteristics, faces distinct challenges and opportunities, and may be influenced differently by factors such as commodity price fluctuations, changes in government policies, and varying levels of firm-specific attributes.

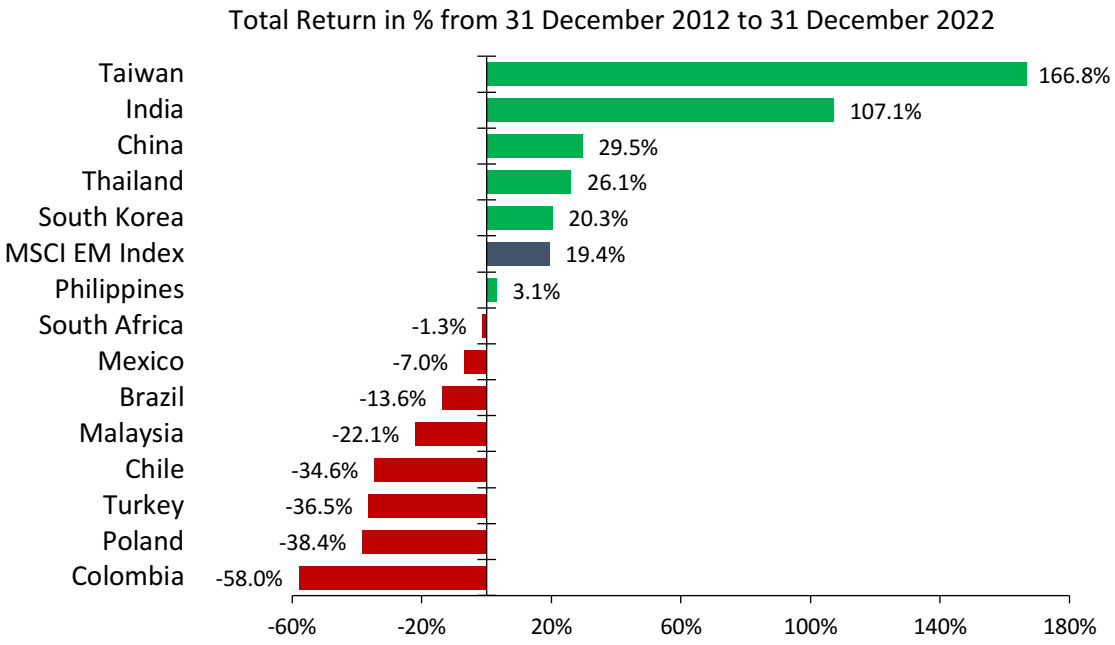

Figure 1: Total Return of Selected EM Countries (data from Bloomberg)

The dynamic nature of EM equity markets is further highlighted by the significant changes in country allocation within the MSCI EM Index over the past 20 years, as illustrated in Figure 2. These changes have been driven by several factors, including shifts in economic growth, politics, and regulatory frameworks.

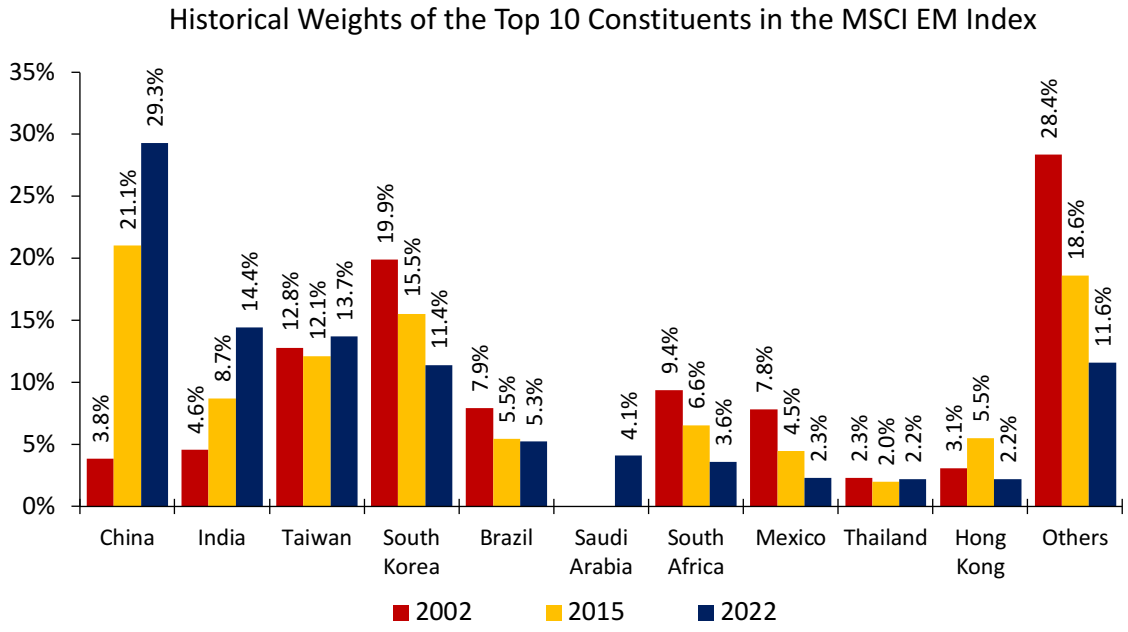

Figure 2: Historical Weights of the MSCI EM Index (data from Bloomberg)

The significant variation in performance can be further be observed by examining systematic factors. MSCI provides the monthly contribution of three systematic factors (countries, sectors, and styles) to quantify the dispersion in stock returns within a specific region (Zhang, 2023). For DM equities, these factors contributed similarly to stock-return variability since 1988, as illustrated in Figure 3. However, in EM economies, the country factor captured on average around 60% of the difference in returns among all individual stocks, while industry and style played a lesser role. Hence, the total return of a specific stock in EM equities was predominantly influenced by the underlying country rather than company sector or style.

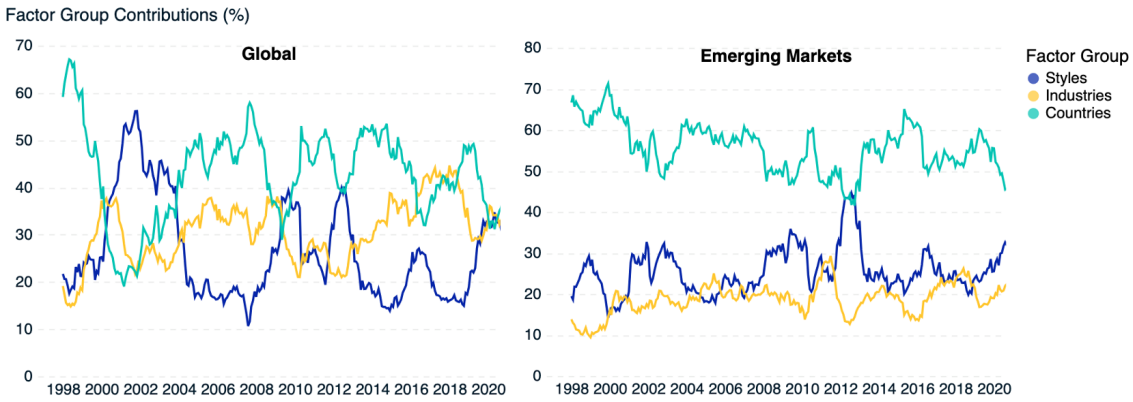

Figure 3: Historical Risk Factor Contribution for Equity Index Returns (Zhang, 2023)

Although there has been considerable academic research investigating the determinants of EM equity returns, there is a notable research gap. First, little research has been done focusing on a broad EM country selection model and considering the return drivers of recent years. Second, in most literature, no investable portfolio strategy for practitioners has been proposed. Third, while recent studies have explored predictive variables within specific domains, they have mostly focused on either firm-specific attributes, macroeconomic indicators, or technical analysis (TA) in isolation without aggregating them in a holistic manner.

1.2 Research Question and Objective of Thesis

The primary focus of this master's thesis is to identify the key determinants of EM equity returns, with an emphasis on country indices rather than individual companies. The applied research considered variables from aggregated company fundamentals analysis (bottom-up), macroeconomic analysis (top-down), and both technical and sentiment indicators. The research question guiding this study can be expressed as follows:

'What are the primary drivers that impact country-specific emerging market equity returns, and to what extent do fundamental, macroeconomic, technical, and sentiment indicators contribute to predicting equity index performance?'

To address this research question, the study employed two panel data regression methods to identify significant explanatory variables across four data sets. Both methods were used to explore the key determinants of future EM equity returns.

In the second step, the identified factors were assessed in terms of their predictive power through portfolio formation and backtesting. This entailed constructing equally weighted portfolios based on the significant variables identified in the regression analysis. The portfolios were formed using a ranking system that selected the top quintile (expected to outperform) and the bottom quintile (expected to underperform). Through backtesting analysis, the study assessed the predictive power of the examined variables.

The objective of this thesis is to provide comprehensive insights into the drivers of EM equity index returns to enhance portfolio performance, implement investment strategies, or assist practitioners in creating an investment research framework for EM country selection.

1.3 Structure

The remainder of this thesis is structured as follows: Chapter 2 presents a review of the existing literature, exploring the current state of knowledge on the key determinants of EM equity returns. The chapter summarises the findings of previous studies and highlights the various factors that have been identified as important drivers of EM equity performance.

Chapter 3 presents a description of the selected equity indices (dependent variable), as well as the investigated country-specific factors (independent variables) used in the study.

Chapter 4 elaborates on the applied regression methods used for the analyses. Furthermore, the chapter outlines portfolio formation and performance analysis to assess the predictive power of the significant variables.

In Chapter 5, the empirical results obtained through the application of the regression models and the portfolio backtesting methodology are presented and interpreted. This chapter highlights the key determinants of EM equity returns and their respective impact on country-specific performance.

Finally, Chapter 6 summarises the main conclusions of the empirical analysis and aims to provide insights for investors and practitioners. The chapter also highlights potential areas for future research in the field of EM equities.

2 Literature Review

This chapter focuses on a narrow selection of the extensive literature that exists on the key determinants of equity returns in DM and EM. While research has primarily focused on firm-specific attributes, macroeconomics, technical, and sentiment indicators, there has been limited exploration of an integrated methodology that combines these factors. The aim of this literature review is to present findings from both perspectives.

2.1 Isolated Approach

Extensive research has been conducted on company-specific attributes to determine their effectiveness in equity country allocation. Zaremba & Szczygielski (2018) analysed various valuation metrics of 73 DM and EM equity indices over the period 1996 to 2017. Of the various measures examined, the ratio earnings before interest, taxes, depreciation and amortisation (EBITDA) to enterprise value (EV) emerged as the most effective predictor of performance. Meanwhile, other popular used measures such as dividend yield or book-to-market ratio performed poorly and generated only modest returns. By constructing an equal-weighted portfolio that was long the highest tertile of countries based on EBITDA-to-EV and short the lowest tertile, the porfolio generated an average monthly return of 0.69% and a Sharpe ratio of 0.81. These results were more than double the Sharpe ratios obtained using traditional measures such as book-to-market ratio or dividend yield. Nevertheless, the authors concluded that abnormal returns were mainly generated in emerging and frontier markets across all ratios.

However, Akhtar (2021) provided evidence that fundamental indicators to evaluate stock returns varied across different markets from 2000 to 2014. The conducted study examined the effects of various commonly used market multiples on European and Southeast Asian countries, including PE, price-to-book (PB), price-to-cashflow, price-to-dividend, price-to-sales (PS), and dividend growth. Although most popular metrics had a significant coefficient, the applied panel regression results showed that an increase in the PE ratio or dividend growth led to higher future returns in European equities, while having a negative effect on equities in Southeast Asia. Hence, the authors observed a notable disparity how market multiples affect equity return in EM versus DM.

Other studies included a longer time frame to examine the relationship. Hsu et al. (2022) employed data from 15 emerging and 21 developed equity markets, covering timeframes ranging from 32 to 120 years, in order to identify factors that determine equity returns at the country level. The authors suggest that the key drivers for EM equity returns

include the price-to-earnings (PE) ratio, growth in earnings per share (EPS), dividend yield, and growth in dividend per share (DPS). While the authors acknowledge that changes in PE ratios have a substantial influence on stock returns in the short term, they observe that the importance of PE ratio changes diminishes over the long term. This is because companies can generate high returns for investors even if PE ratios remain unchanged, provided there is a high dividend yield or significant earnings per share growth. Moreover, the authors emphasised that relying on the country's gross domestic product (GDP) growth as a predictor for future equity returns is not reliable, as GDP growth does not necessarily translate into higher company profits.

This view is supported by Hooker (2004), who examined the predictive ability of various macroeconomic factors on EM equity returns using the Bayesian model selection approach. Based on the analysis, the paper concludes that macroeconomic factors have limited predictive power for emerging market equity returns, while financial factors are more reliable predictors. The macroeconomic variables included in the study were the local interest rate, the real interest rate relative to trend, the GDP forecast change, inflation and the exchange rate. The results of the study strongly refute the effectiveness of all the macroeconomic factors considered, except for changes in exchange rates. Conversely, the study provided support for several fundamental factors, such as PE ratio, as significant predictors of excess returns.

However, a more recently published study conducted by Narayan et al. (2014) presented different findings on the predictability of macroeconomic indicators for excess stock returns in emerging markets. The study analysed a sample period spanning from 1987 to 2011 and considered a range of macroeconomic and institutional factors. These factors included variables such as budget balance, current account balance, exports of goods and services, debt service, exchange rate stability, foreign debt, GDP growth, inflation, and international liquidity. The main conclusion drawn from the study was that institutions were able to predict equity returns in 12 out of the 18 countries examined, while macroeconomic variables demonstrated predictability in nine countries. The results highlighted the heterogeneity among countries, with some exhibiting predictability based on institutional factors, some based on macroeconomic variables, and others where none of the factors could effectively predict returns. In total, the study found evidence that either institutions, macroeconomic variables, or a combination of both were able to predict excess returns in 15 of the 18 developing countries investigated.

Meanwhile, other authors relied on the field of technical analysis to predict future EM equity returns. Metghalchi et al. (2019) employed various popular technical analysis indicators, including moving average (MA), relative strength index (RSI), moving average convergence divergence (MACD) as trading rules for the MSCI EM Index. Their backtesting strategy covered the period from November 1988 to April 2017, resulting in significant evident that investors can outperform the benchmark by considering technical analysis, even after accounting for additional risk factors and transaction costs. Technical analysis has been demonstrated to be beneficial not only in broader emerging market contexts but also in specific local markets, such as South Africa (Metghalchi et al., 2021) and Russia (Nor & Zawawi, 2019). These studies provide further evidence of the effectiveness and applicability of technical analysis methodologies in enhancing investment strategies for EM equities.

2.2 Integrated Approach

There is relatively little published literature that has focused on predictive variables across different classes. Kortas et al. (2005) conducted one of the few studies that followed an integrated approach across several categories, using data from 23 EM equity markets over the period 1986 to 2003. The study examined four categories of variables (fundamental, macroeconomic, technical, and country risk) as predictors of future returns in these markets. The researchers proposed a multivariate scoring model that incorporated these variables to predict the performance of EM equity markets. The study found that the multivariate model which included all four classes of variables outperformed models that contained only one class of variables. Specifically, the long-short portfolio strategy based on the multivariate model, which ranked the top and bottom 11 countries, generated significant average raw returns and risk-adjusted returns on a quarterly basis over the periods 1986 to 1995 and 1996 to 2003. The study also examined the performance of portfolios based on individual classes of variables. The results showed that the fundamental-only model produced the highest ratio of return to volatility. The all-class and fundamental-only models had significant excess returns at the 1% level, indicating their superior performance. The macro-only and country risk models had generated significant excess return at the 10% level, while the technical model was not significant at the 10% level.

3 Data Collection and Description

This chapter provides further details on the collected panel data sets used to answer the research question. The examined data was retrieved from a Bloomberg terminal and analysed in Microsoft Excel and R Studio. The corresponding Microsoft Excel workbooks and R Studio script used for data processing are provided in the appendix A and B.

3.1 Dependent Variables

The following section elaborates on the dependent variables used in this thesis. Specifically, it examines the three-month forward return of EM country equity indices, which serves as a key measure to assess relative returns and explore the factors driving the performance of these equity returns. For this study, 14 EM countries were analysed using MSCI's single-country total return gross index, which includes dividends and is denominated in US dollars.

Country	Bloomberg Ticker	Number of constituents	Weight in MSCI EM Index
Brazil	MX2R Index	49	5.25%
Chile	M2CL Index	12	0.50%
China	M2CN Index	670	29.28%
Colombia	M2CO Index	3	0.12%
India	M2IN Index	113	14.42%
Malaysia	M2MY Index	34	1.57%
Mexico	M2MX Index	23	2.28%
Philippines	M2PH Index	18	0.74%
Poland	M2PL Index	13	0.71%
South Africa	M2ZA Index	35	3.60%
South Korea	M2KR Index	102	11.39%
Taiwan	M2TW Index	86	13.69%
Thailand	M2TH Index	42	2.22%
Turkey	M2TR Index	15	0.67%

Number of constituents and index weight as of 31 December 2022

Table 1: EM Country Indices in Data Sets

The country indices utilised in this study follow the 'MSCI Global Investable Indexes (GIMI) Methodology', which enables the creation of meaningful global perspectives and facilitates comparisons across various regions. The methodology has a particular focus on ensuring index liquidity, investability, and market capitalisation of the underlying company constituents (MSCI Inc., 2023). The number of constituents and the index

weight at the end of 2022 in Table 1 are for informational purposes only. Although these figures have varied considerably over time, this aspect can be disregarded in the analysis, because Bloomberg's historical data query for MSCI equity indices considers all constituent rebalancing and weighting adjustments, ensuring that the analysis remains unbiased.

It is important to note that the analysis excludes several large EM equity markets. Russia was removed from the MSCI EM Index in 2022 due to sanctions, while Middle Eastern countries such as Saudi Arabia, the United Arab Emirates, Kuwait, and Qatar were also excluded from the analysis due to limited macroeconomic and fundamental data availability before 2015.

The monthly total return gross index price provided the basis to calculate the dependent variable used in the regression, namely the three-month forward return (fwd_returns_3m) for each country index using the following formula:

$$r_i = \frac{P_{i,t+3}}{P_{i,t}} - 1$$

where:

r_i = Three-month forward return for the country index i

$P_{i,t}$ = Price of the country index i at month t

$P_{i,t+3}$ = Price of the country index i at month t_{+3}

3.2 Independent Variables

The following section describes the 16 independent variables under examination, which were categorised into three distinct groups:

- Fundamental indicators
- Macroeconomic indicators
- Technical & sentiment indicators

A more detailed explanation of each independent variable based on the definitions provided by the Bloomberg terminal is provided in the sections that follow.

As a first step, monthly data on all independent variables from January 2000 to December 2022 was obtained to ensure a large sample period for the analysis. This step was crucial to assessing the potential sample period as well as missing data for each variable. Due to limitations in data availability, four different data sets were created, which differ in terms of the number of countries and the analysis period.

Two data sets were created for the fundamental indicators. The first data set includes all 14 countries, with a sample period beginning in February 2012. The second data set includes 11 countries and begins in December 2006, thus covering the effects of the global financial crisis (GFC) of 2007–2008. The third data set, which focuses on macroeconomic variables, includes only 10 countries and has a sample period beginning in December 2006. Finally, the fourth data set, which examines technical and sentiment indicators for all 14 countries, begins in January 2003. Table 2 provides an overview of the 16 independent variables in the four data sets.

Data Set	**Sample period and countries**	**Variable**	
Fundamentals 1	Feb 2012 – Dec 2022 14 countries	PE	Price-to-earnings ratio (12-month forward)
		PB	Price-to-book ratio (12-month forward)
Fundamentals 2	Dec 2006 – Dec 2022 11 countries (excluding Colombia, Chile, and Korea)	EPS	Earnings per share (12-month forward)
		DPS	Dividend per share (12-month forward)
		PS	Price-to-sales ratio (12-month forward)
		ROE	Return on equity (3-month forward)
Macroeconomics	Dec 2006 – Dec 2022 10 countries (excluding Colombia, India, Philippines, and Thailand)	IP	Industrial production
		CPI	Consumer price index
		TB	Trade balance
		GBS	Government bond spread
		CAI	Goldman Sachs current activity indicator
Technicals and sentiment	Jan 2003 – Dec 2022 14 countries	MA	Distance from the 200-day moving average
		MBR	Market breadth
		RSI	Relative strength index over 30 days
		ESPR	Citi economic surprise index
		CMD	Citi commodities terms of trade Index

Table 2: Independent Variables in Data Sets

In alignment with Bekaert et al.'s (2023) approach, all independent variables were standardised into *z*-scores for each country and for each variable to ensure comparability and eliminate any differences in scale or units across the variables. Standardising the variables for each country individually allows the inherent differences and characteristics of each country index to be best captured, as deviations from the mean differ significantly across countries for each variable. The *z*-score transformation across the investigated sample period for each data set is carried out using the following formula, where x represents the original value, μ represents the mean, and σ represents the standard deviation of the variable:

$$z = \frac{x - \mu}{\sigma}$$

3.2.1 Fundamental Indicators

The fundamental indicators for the 14 MSCI EM country indices, obtained from Bloomberg, are reported in a market-weighted manner. This means that the aggregation methodology considers the weighting of each constituent company within the respective country index. In simpler terms, when calculating the valuation metric for a country index, the contribution of each constituent company is factored in based on its weight in the index. This methodology ensures a reliable assessment of the overall equity valuation level of each country index. Furthermore, only forward estimates from the Bloomberg consensus were included, as opposed to historical company data. A forward estimate of the analyst consensus, which is reflected by the mean of the sell-side analysts, allows for a more accurate forecast of a company's performance, since it is aligned with market expectations.

The following is a description of the six independent fundamental variables used in this study. Each metric is calculated using the Bloomberg consensus estimate for the constituent companies included in the index. It is important to note that the aggregation methodology encompasses additional steps, such as foreign currency conversions and the inclusion of an index divisor. The index divisor is an arbitrary value adjusted to ensure comparability of the index value following changes in constituent weighting and capitalisation adjustments. However, the specific details of the aggregation calculations and adjustments are not detailed in this study.

- PE: The forward price-to-earnings ratio (PE) is calculated as the index level divided by the estimated earnings per share (EPS) over the next 12 months of all constituents.

$$Forward\ PE\ Ratio = \frac{Index\ Level}{Estimated\ EPS\ Over\ the\ Next\ 12\ Months}$$

- PB: The forward price-to-book ratio (PB) is calculated as the index value divided by the estimated book value per share (BPS) over the next 12 months of all constituents.

$$Forward\ PB\ Ratio = \frac{Index\ Level}{Estimated\ BPS\ Over\ the\ Next\ 12\ Months}$$

- EPS: Forward earnings per share (EPS) reflects the estimated portion of a company's net income allocated to each shareholder over the next 12 months. It is calculated based on net income available for common shareholders divided by the weighted average of shares outstanding.

$$Forward\ EPS\ = \frac{Estimated\ Net\ Income\ Over\ the\ Next\ 12\ Months}{Weighted\ Average\ of\ Shares\ Outstanding}$$

- DPS: Forward dividends per share (DPS) reflects the estimated portion of a company's earnings allocated to each shareholder over the next 12 months as dividends. It is calculated based on the total dividends paid to its common shareholders divided by the shares outstanding.

$$Forward\ DPS\ = \frac{Estimated\ Total\ Dividends\ Over\ the\ Next\ 12\ Months}{Shares\ Outstanding}$$

- PS: The forward price-to-sales ratio (PS) is calculated as the index market capitalisation divided by the estimated revenue over the next 12 months of all constituents.

$$Forward\ PS\ Ratio = \frac{Index\ Market\ Capitalization}{Estimated\ Revenue\ Over\ the\ Next\ 12\ Months}$$

- ROE: Forward return on equity (ROE) reflects estimated profitability over the next 12 months by revealing how much profit a company will realise with the equity capital of shareholders. ROE is calculated as the net income available for common shareholders divided by the average of total common equity.

$$Forward\ ROE = \frac{Index\ Market\ Capitalization}{Average\ Total\ Common\ Equity}$$

With the fundamental variables retrieved from Bloomberg, a conversion from absolute to relative values was conducted to assess the valuation level of each country index relative to the benchmark, the MSCI EM Index. This approach enables a comparative assessment of the relative valuation levels of the country indices. The rationale for applying fundamental metrics relative to the benchmark index was the large dispersion of valuation metrics across countries. Damodaran (2022, p. 6) has highlighted the difference in equity risk premiums across regions and argued, that country risk should be incorporated into the valuation process of EM equities. Therefore, absolute valuation metrics alone may not capture the nuanced differences in valuation levels between the selected EM countries due to country-specific risks. This study's method, using a relative valuation approach and comparing the fundamental indicators with the benchmark index, considers the differences in risk profiles and market dynamics among countries. As a result, this methodology allows for a more meaningful analysis of whether a country index is overvalued or undervalued over time.

3.2.2 Macroeconomic Indicators

Five macroeconomic indicators were retrieved separately for each country. The Bloomberg Query Language (BQL) was used to identify the individual Bloomberg ticker with the same unit across all countries, such as year-on-year or denomination in US dollars.

- Industrial production (IP): Country-specific IP measures the output of industrial establishments in the industries of mining and quarrying, manufacturing, and public utilities (i.e. electricity, gas and water supply). To adjust for seasonal fluctuations and short-term volatility in the data, IP was reported as a year-on-year percentage change variation. This calculation involves comparing the monthly IP data with its corresponding data for the same month in the previous year. Due to data availability

constraints, seasonally adjusted IP data were not available for all 14 countries. As a result, the data set includes both seasonally adjusted and unadjusted IP data.

- Consumer price index (CPI): Country-specific inflation, which represents the price changes in goods and services, is measured using CPI. To take account of seasonal effects and reduce short-term volatility in the data, year-on-year percentage change variations of the monthly inflation data were obtained.

- Trade balance (TB): The international TB measures the difference between the movement of goods and services out of a country (exports) and the movement of goods and/or services into a country (imports). Therefore, TB serves as a measure of net trade flows and indicates whether a country has a surplus or deficit in its international trade transactions. The variable is denominated in US dollar and is not seasonally adjusted across all countries.

- Government bond spread (GBS): The difference in bond yields between government bonds and US Treasuries is called 'spread' and reflects the perceived risk and creditworthiness of a country's government debt. For 12 countries, the country specific GBS provided by the J.P. Morgan Emerging Markets Bond Index Global Diversified (EMBIG) was retrieved. EMBIG is a widely recognised index, which tracks liquid US dollar debt instruments issued by sovereign and quasi-sovereign entities (Kim, 2019). As South Korea, Taiwan, and Thailand are not included in the EMBIG index, alternative measures were used as proxies for credit risk for these countries. Credit default swaps (CDS) were taken as an indicator of credit risk in South Korea, while corporate spreads were used for Taiwan and Thailand. CDSs are financial instruments that protect against credit default and corporate spreads represent the yield differential between issued corporate bonds and US treasuries, thereby indicating the additional risk premium that investors demand for holding corporate debt.

- Goldman Sachs' Current activity indicator (CAI): The CAI developed by Goldman Sachs, measures the level of economic activity in a specific country on a weekly and monthly basis. The index incorporates high-frequency real activity signals that provide timely insights into economic activity, manufacturing, and employment data (Nathan et al., 2023).

This study aimed to examine additional macroeconomic indicators such as foreign direct investment (FDI), unemployment, retail sales, business confidence, consumer confidence, and the purchasing managers' index (PMI). However, due to missing data, limited sample periods, and the availability of data only on a quarterly basis, these macroeconomic indicators could not be included. [1]

3.2.3 Technical and Sentiment indicators

Three variables in the field of technical analysis and two economic indicators from Citibank that are intended to reflect a country's investor sentiment were aggregated into one class. Although the two selected indicators from Citibank are not classic investor sentiment indices per se and represent macroeconomic changes, the methodology reflects timely signals that are considered a useful measures of a country's general investment mood.

- Distance from the 200-day moving average (MA): The MA is used as a trend indicator. It is obtained by calculating the difference between the index level and the average index level over the preceding 200 days. The monthly calculation of the MA required a manual BQL iteration, as the corresponding Bloomberg field (MOV_AVG_200D) does not provide historic data.

$$Distance\ From\ 200\text{–}Day\ Moving\ Average\ = \frac{Index\ Level}{Average\ of\ Index\ Level\ Over\ Past\ 200\ Days} - 1$$

[1] Please refer to the bql_eco_data tab in excel workbook 2_values_bloomberg, for a full understanding of the other potential variables examined, including their respective starting dates.

- Market breadth (MBR): MBR is used to assess the overall strength and trend direction of the market, as it measures number of advancing and declining constituents in the index. In this study, it is calculated as the percentage of index members which trade above their 200-day moving averages.

$$Market\ Breadth\ = \frac{Constituents\ above\ 200\ Day\ MA}{Total\ Constituents}$$

- Relative Strength Index (RSI): RSI is a non-trending indicator that measures the momentum of the country index to determine whether it is in an overbought or oversold condition. RSI is calculated by measuring price movements and comparing average gains and losses over a 30-day period. RSI oscillates on a scale from 0 to 100. A reading above 70 warns of an overbought condition, indicating that a downward correction is likely, whereas a reading below 30 indicates an oversold condition and warns of an imminent upward correction.

$$RSI = 100 - \left[\frac{100}{1 + \frac{Average\ Gains\ over\ 30\ Days}{Average\ Losses\ over\ 30\ Days}}\right]$$

- Citi Economic Surprise Index (ESPR): The ESPR of a country measures data surprises relative to market expectations. A positive reading means that economic data releases have been stronger than expected, while a negative reading means that economic data releases have been worse than expected.

- The Citi Commodities Terms of Trade Index (CMD): A country's CMD indicates the relative performance of commodity export and import prices. A positive reading means that export prices for the country have increased more significantly than import prices, whereas a negative reading means that import prices have increased more significantly than export prices.

3.3 Data Overview and Exploratory Analyses

An extended analysis of the balanced panel data set was conducted using R Studio and various statistical methods and visualization techniques. In Table 3, descriptive statistics are provided for the various data sets. The total number of observations (*n*) in the balanced panel data sets varies from 1,834 to 3,360 across the data sets due to differences in the sample period (*T* ranging from 131 to 240 months) and in the number of countries (*N* includes either 10, 11, or 14 countries). There are no missing values in the data sets.

Data Set 1: Fundamentals (excluding GFC)
Feb 2012 – Dec 2022, T = 131 Months, N = 14 Countries

Variable	n = Total Observations	Mean	Median	SD	Min	Max
fwd_returns_3m	1,834	0.0091	0.0120	0.1200	-0.5000	0.6300
PE	1,834	0.0000	-0.0110	1.0000	-3.6000	3.7000
PB	1,834	0.0000	-0.0630	1.0000	-6.0000	3.2000
EPS	1,834	0.0000	-0.1300	1.0000	-2.8000	5.6000
DPS	1,834	0.0000	-0.0710	1.0000	-2.7000	6.0000
PS	1,834	0.0000	-0.0220	1.0000	-4.2000	6.9000
ROE	1,834	0.0000	-0.0800	1.0000	-4.0000	6.4000

Data Set 2: Fundamentals (including GFC)
Dec 2006 – Dec 2022, T =193 Months, N = 11 Countries

Variable	n = Total Observations	Mean	Median	SD	Min	Max
fwd_returns_3m	2,123	0.0190	0.0230	0.1400	-0.5300	0.8300
PE	2,123	0.0000	-0.0210	1.0000	-3.3000	6.7000
PB	2,123	0.0000	-0.0450	1.0000	-4.6000	4.2000
EPS	2,123	0.0000	-0.1200	1.0000	-2.6000	4.9000
DPS	2,123	0.0000	0.0027	1.0000	-3.2000	6.2000
PS	2,123	0.0000	-0.0260	1.0000	-3.6000	6.7000
ROE	2,123	0.0000	-0.0760	1.0000	-3.5000	7.6000

Data Set 3: Macroeconomics
Dec 2006 – Dec 2022, T = 193 Months, N = 10 Countries

Variable	n = Total Observations	Mean	Median	SD	Min	Max
fwd_returns_3m	1,930	0.0160	0.0180	0.1400	-0.5300	0.6300
IP	1,930	0.0000	0.0180	1.0000	-5.1000	9.7000
CPI	1,930	0.0000	-0.1900	1.0000	-2.7000	4.5000
TB	1,930	0.0000	-0.0870	1.0000	-3.2000	4.6000
GBS	1,930	0.0000	-0.2300	1.0000	-2.5000	5.4000
CAI	1,930	0.0000	0.0590	1.0000	-11.0000	7.9000

Data Set 4: Technicals & Sentiment
Jan 2003 – Dec 2022, T = 240 Months, N = 14 Countries

Variable	n = Total Observations	Mean	Median	SD	Min	Max
fwd_returns_3m	3,360	0.0340	0.0350	0.1400	-0.5300	0.8300
MA	3,360	0.0000	0.0180	1.0000	-4.2000	4.1000
MBR	3,360	0.0000	0.1200	1.0000	-2.7000	2.0000
RSI	3,360	0.0000	-0.1000	1.0000	-2.6000	3.8000
ESPR	3,360	0.0000	0.0081	1.0000	-4.9000	4.5000
CMD	3,360	0.0000	0.0560	1.0000	-4.0000	3.1000

Table 3: Descriptive Statistics of Entries in all Data Sets

In all four data sets, the dependent variable shows positive average returns over a three-month period. The means range from 0.0091 (Data Set 1) to 0.0340 (Data Set 4), while the medians range from 0.0120 (Data Set 1) to 0.0350 (Data Set 4), indicating relatively high average returns in data set 4, which has the longest sample period. However, there is little variability in the returns across all data sets, as reflected by the standard deviations (SD), which range from 0.1200 (Data Set 1) to 0.1400 (Data Sets 2, 3, and 4). In terms of the range of returns observed, the minimum and maximum values for 'fwd_returns_3m' range from -0.5300 (Data Set 2) to 0.8300 (Data Sets 2 and 4), reflecting the strong upside and downside movements in EM equities. Due to the z-standardization (see Section 3.2), means are equal to 0 and standard deviations are 1.

Beyond descriptive statistics, the boxplot analysis (See Figures 4–7) reveals the presence of outliers in all variables. The outliers in ROE, CAI, IP, MA, and ESPR can be explained primarily by the influence of exceptional economic conditions, including periods of recession or financial distress, such as the aftermath of the COVID-19 pandemic. Rather than invalidating the analysis, such outliers can be seen as providing valuable insights into the data's distribution and facilitating important observations, while highlighting the need for robust statistical techniques and the cautious interpretation of results.

In addition to the boxplots presenting the distribution and summary statistics of the variables in each data set, scatterplots were created to explore the relationships between the variables. Scatterplots provide a visual representation of the variables in each data set and can help identify any potential trends, clusters, or outliers (Newbold et al., 2013, p. 48). Due to space limitations, the diagrams have been included in the Appendix C. Certain variables in the four data sets tend to increase together, suggesting a positive correlation between them.

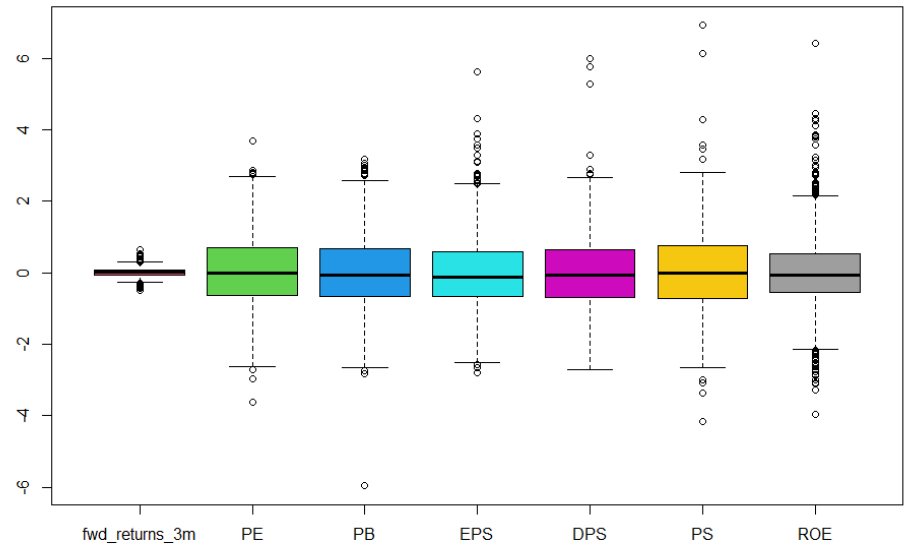

Figure 4: Boxplot of Data Set 1 – Fundamentals (excluding GFC)

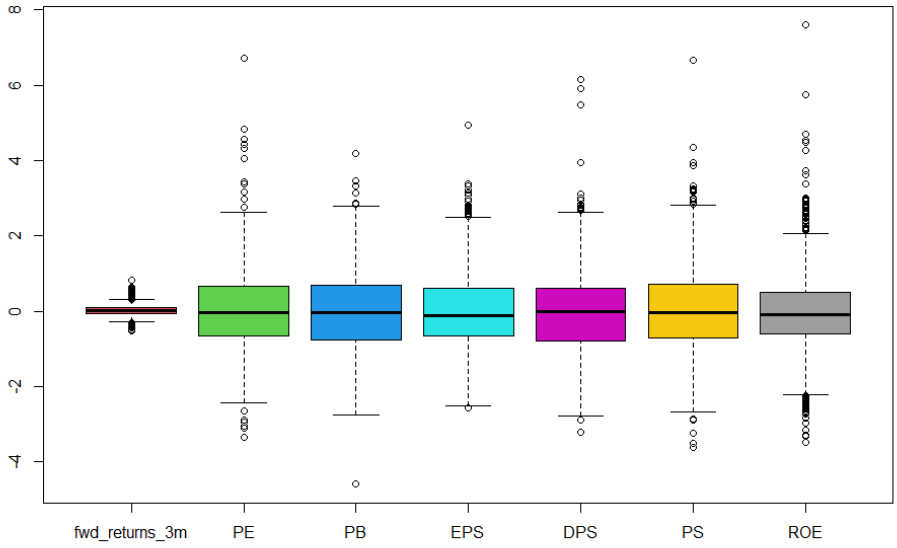

Figure 5: Boxplot of Data Set 2 – Fundamentals (including GFC)

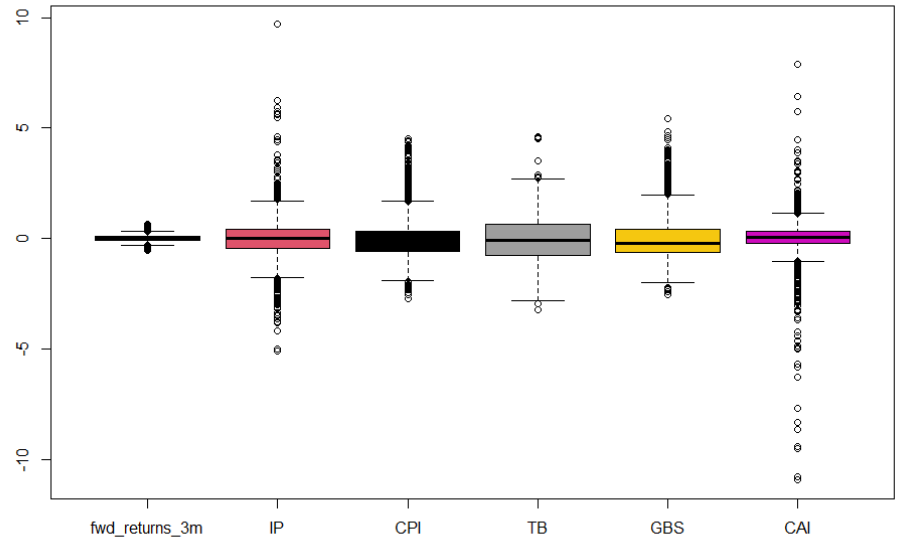

Figure 6: Boxplot of Data Set 3 – Macroeconomics

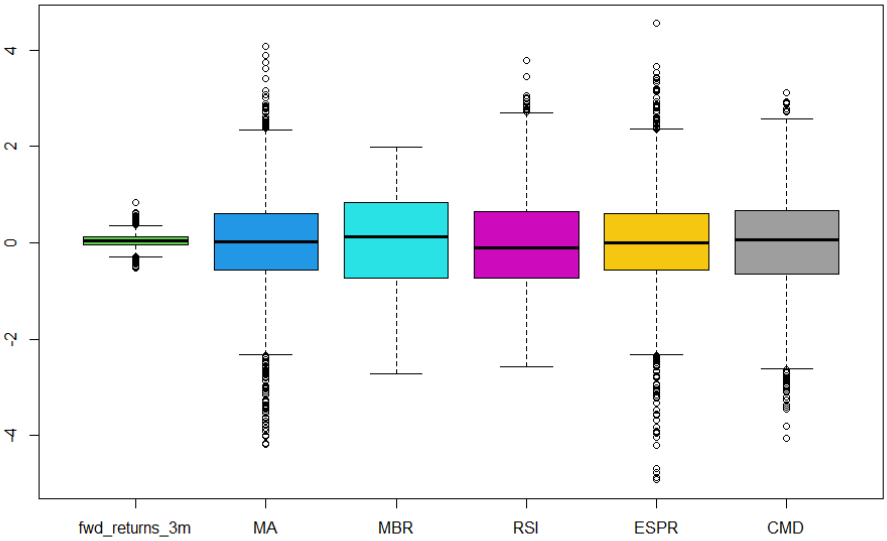

Figure 7: Boxplot of Data Set 4 – Technicals & Sentiment

Given these observed patterns, a correlation matrix (see Figure 8) for each data set was constructed to assess the strength and direction of the relationships between the variables. The correlation matrix provides a further insight into the pairwise correlations. Positive correlations indicate that as one variable increases, the other tends to increase as well, while negative correlations suggest an inverse relationship. The correlation matrices reveal notable correlations between certain variables, as indicated by the prominent blue colour. Therefore, additional statistical tests were carried out in Chapter 5 to detect potential multicollinearity and ensure validity of the findings.

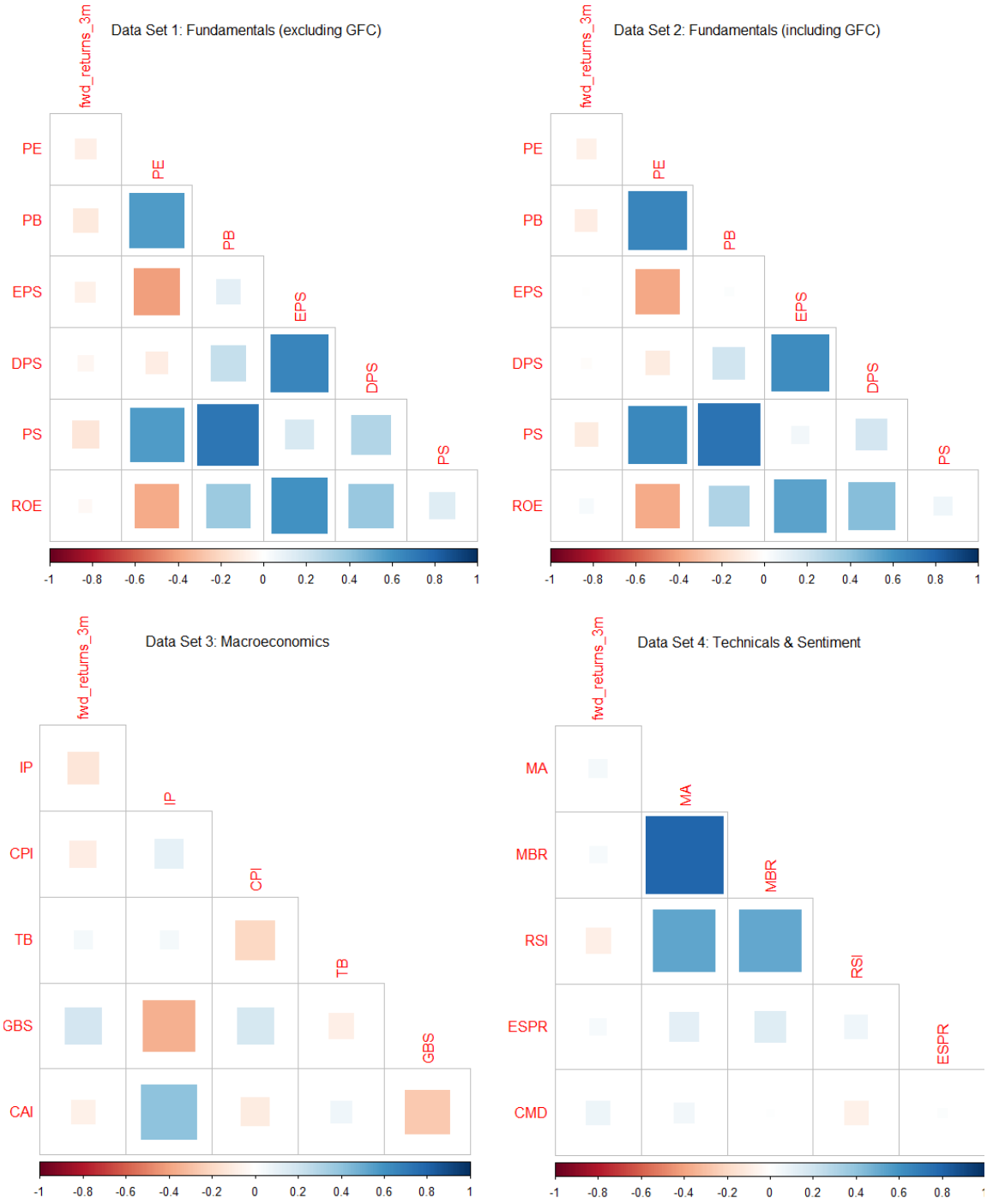

Figure 8: Correlation Matrix of All Data Sets

4 Method of Analysis

This chapter introduces two regression models used to analyse the relationships among the 16 explanatory variables and the three-month forward return of EM equities. Several test statistics are calculated to assess the reliability of the results. In addition, the chapter explains the process of portfolio formation and evaluates its performance using various portfolio risk metrics.

4.1 Mean Group Estimation

The first approach to examining the relationship between the three-month forward return of EM equities and the selected independent variables in the four panel data sets is the mean group (MG) estimator proposed by Pesaran and Smith (1995). The MG estimator method has been widely employed in various fields, including economics and finance, as it enables the analysis of panel data by simultaneously considering both cross-sectional and time-series dimensions. Country-specific coefficients can be obtained by employing MG estimation, accounting for the variation in relationships among the variables across countries. Hence, MG estimation allows for the capture of heterogeneity across EM economies. For this study, MG estimation was performed using the R Studio `'plm'` package and the `'pmg()'` function designed for this study.

The MG estimator procedure is a computationally simple approach. The first step is to obtain individual coefficients for each country by conducting individual ordinary least squares (OLS) regressions. The regression model for each country (N indexed by i), over the entire sample period (T indexed by t) and for each independent variable in the data set (x) is therefore as follows:

$$y_{i,t} = \alpha_i + \beta_{1i}x_{1i,t} + \beta_{2i}x_{2i,t} + \cdots + \beta_{pi}x_{pi,t} + \epsilon_{i,t}$$

where:

$y_{i,t}$ = Three-month forward return for country i at time t

α_i = Intercept of country i

β_{ji} = Coefficient for the j-th independent variable specific to country i

$x_{ji,t}$ = j-th independent variable for country i at time t

$\epsilon_{i,t}$ = Error term

In the second step, the country-specific coefficients obtained from the OLS regressions are averaged to derive the mean group coefficients. Consequently, the mean group coefficients are derived as follows, where N is the total number of countries, while $\bar{\alpha}$ and $\bar{\beta}_j$ represent the averaged coefficients obtained from the first step:

$$\bar{\alpha} = \frac{1}{N}\sum_{i=1}^{N} \alpha_i$$

$$\bar{\beta}_j = \frac{1}{N}\sum_{i=1}^{N} \beta_{ji}$$

The resulting MG estimator model to obtain standard errors, significance levels, and other statistics can then be formulated as follows:

$$y_t = \bar{\alpha} + \bar{\beta}_1 x_{1t} + \bar{\beta}_2 x_{2t} + \cdots + \bar{\beta}_p x_{pt} + \epsilon_t$$

4.2 Pooled Mean Group Estimation

To determine the relationship between country-specific indicators and the performance of equities, various authors (Dewandaru et al., 2014; Megaravalli & Sampagnaro, 2018; Dodig, 2020; Lone et al., 2021) have used the MG estimator in combination with the pooled mean group (PMG) estimation. The PMG estimation by Pesaran et al. (1999) introduced additional dynamics and cross-sectional information to address the limitations of the MG estimator approach. The key advantage of the PMG estimator is the incorporation of lagged dependent variables. The PMG estimator captures a lower degree of heterogeneity by imposing homogeneity in the long-run coefficients while enabling heterogeneity in the short-run coefficients and error variances. This means that the PMG estimator examines both the long-term equilibrium relationship (i.e. the cointegration relationship) between the independent variables and the EM equity returns, as well as the short-run dynamics of how deviations from this long-term equilibrium are corrected over time. Hence, the PMG estimator follows the assumption that the cross-sectional EM equity returns respond differently to changes in the examined variables in the short term, but eventually move towards a consistent long-term equilibrium.

As described by Pesaran et al. (1999), the PMG estimation is a an extension of the autoregressive distributive lag (ARDL) model. Therefore, to capture both the short-run dynamics and the long-run equilibrium relationships in the PMG estimator, a re-parameterised error correction model (ECM) is required. The time-series observation for each country (i), can be formulated as follows (Pesaran et al., 1999, p. 624):

$$\Delta \mathrm{y}_i = \phi_i \mathrm{y}_{i,-1} + \mathrm{X}_i \beta_i + \sum_{j=1}^{p-1} \lambda_{ij}^* \Delta \mathrm{y}_{i,-j} + \sum_{j=0}^{q-1} \Delta \mathrm{X}_{i,-j} \delta_{ij}^* + \mu_i + \varepsilon_i$$

where:

y_i = Vector for dependent variable (three-month forward return)

ϕ_i = Autoregressive coefficient (determines the error-correcting speed of adjustment)

X_i = Vector for the independent variables

β_i = Coefficient vector for the independent variables

λ_{ij}^* = Coefficients of the lagged dependent variables

δ_{ij}^* = Coefficients of the lagged independent variables

μ_i = Country-specific fixed effects

$\epsilon_{i,t}$ = Error term

A Hausman test can be conducted to assess the suitability of employing the PMG approach (Pesaran et al., 1999, p. 627). Hausman (1978) proposed this test to choose between two estimators, β_o and β_1, for the parameter vector β. The Hausman test assesses the consistency and efficiency of the PMG approach relative to the MG approach. The null hypothesis H_0 assumes that the PMG estimators are consistent and efficient. In contrast, the alternative hypothesis H_1 assumes that the PMG estimators are inconsistent, as MG estimators provide consistent estimates of the mean of the long-run coefficients (Pesaran et al., 1999, p. 627).

The test statistic of the Hausman test measures the difference between the estimates as follows:

$$H = \left(\hat{\beta}^{PMG} - \hat{\beta}^{MG}\right)' \left[\mathrm{Var}\left(\hat{\beta}^{PMG}\right) - \mathrm{Var}\left(\hat{\beta}^{MG}\right)\right]^{-1} \left(\hat{\beta}^{PMG} - \hat{\beta}^{MG}\right)$$

If the Hausman test result has a *p*-value smaller than 0.05, it indicates a significant difference between the two estimators. As a result, the null hypothesis can be rejected, indicating that the PMG model is not consistent and that the more appropriate choice would be to use the MG estimators. Conversely, if the *p*-value of the Hausman statistic is larger than 0.05, this implies that the PMG estimator is more appropriate for the given data. In these cases, the null hypothesis is not rejected, indicating that the PMG model is consistent and can be used.

Although the PMG estimation was also considered for this study, it was not included as an additional model. As explained previously, the PMG approach allows for heterogeneity in the short run while assuming homogeneity in the long run. However, given this study's focus on capturing heterogeneity and examining the influence of the selected explanatory variables at the country level, the MG estimation was selected as the primary model.

4.3 Pooled OLS Regression

As an alternative to the PMG estimation, this study employed the pooled OLS regression (POLS) as its second model, in an approach that aligns with the methodology employed other researchers in related studies (Hjalmarsson, 2010; Lawrenz & Zorn, 2017; Wisniewski & Jackson, 2021). POLS treats all countries as one large sample and estimates a single set of coefficients for the entire data set, without accounting for individual heterogeneity. As a result, the POLS model assumes homogeneity and pools all observations into one large regression. In contrast, the MG estimation provides a more granular analysis by considering the individual dynamics of each country. However, the inclusion of both models allows for a comprehensive analysis and provides diverse insights into the predictability of variables and the presence of heterogeneity among EM equities POLS estimation is performed using the `'plm'` package in R Studio and the dedicated `'plm()'` function with `'pooling'` model selection.

Since POLS runs only one regression for each data set over the entire sample period, the model is as follows:

$$y_{i,t} = \beta_0 + \beta_1 x_{1i,t} + \beta_2 x_{2i,t} + \cdots + \beta_i x_{i,t} + \epsilon_{i,t}$$

where:

$y_{i,t}$ = Three-month forward return for country i at time t

β_0 = Intercept term

β_i = Coefficient for the j-th independent variable

$x_{i,t}$ = Independent variable for country i at time t

$\epsilon_{i,t}$ = Error term

4.4 Statistical Diagnostics and Testing

Before conducting the MG estimation and pooled OLS regression, it is essential to test for stationarity. A stationary time series has a consistent mean, variance, and autocovariance over time, allowing reliable inference and prediction. Conversely, non-stationary data can lead to spurious regression results and misleading conclusions. A widely used stationarity test is the augmented Dickey–Fuller (ADF) test. The ADF test statistic is calculated using the following regression model (Dickey & Fuller, 1979):

$$\Delta Y_t = \alpha + \beta t + \gamma Y_{t-1} + \sum \delta_i \Delta Y_{t-i} + \varepsilon_t$$

In this model, ΔY_t represents the differenced time series, α denotes the intercept term, β is the time trend coefficient, Y_{t-1} represents the lagged dependent variable, $\sum \delta_i \Delta Y_{t-i}$ accounts for the lagged differenced terms, and ε_t is the error term. The test statistic for the ADF can be calculated as follows, where $\hat{\gamma}$ stands for the estimated coefficient from the regression model and $SE(\gamma)$ for the standard error of the estimated coefficient:

$$\frac{\hat{\gamma}}{SE(\gamma)}$$

The '`adf.test()`' function from the '`tseries`' package in R Studio was used to perform the ADF test for each variable in the data set. The null hypothesis H_0 of the ADF test is that the time series has a unit root and is non-stationary, while the alternative hypothesis

H_1 suggests stationarity. By calculating the ADF test statistic and comparing it with critical values, it can be decided whether to reject the null hypothesis and favour the presence of stationarity. If the *p*-value is below the predetermined significance level, according to Banerjee et al. (1993, p. 103), it should be considered statistically significant, leading to the rejection of the null hypothesis (Trapletti et al., 2023, p. 3).

Furthermore, to ensure the accuracy and validity of linear regression, several assumptions must be met. These assumptions are evaluated in the diagnostic testing stage, which involves storing and utilising the fitted estimations from both the MG and POLS model. The first assumption is the absence of multicollinearity, which describes the correlation between the independent variables. To check for multicollinearity, the Variance inflation factor (VIF) test is applied using the `'car'` package in R Studio. The VIF is calculated for each independent variable by quantifying the effect of collinearity on the variance of the regression estimates. The VIF as an indication of collinearity has been debated in the literature. However, a commonly used threshold suggests that a VIF value greater than 10 indicates a high degree of multicollinearity (O'Brien, 2007). If an independent variable exceeds this threshold, the explanatory power this variable offers is already accounted for by other variables.

Another crucial assumption is the presence of homoscedasticity, which requires that the residuals have constant variance across different levels of the independent variables. By contrast, the presence of heteroscedasticity, or unequal variances of the residuals across different levels of the independent variable, violates the assumptions of linear regression. To detect heteroskedasticity, the Breusch–Pagan test was applied by using the `'bptest()'` function from the `'lmtest'` package. The purpose of this test is to determine, using a separate regression analysis, whether the variance of errors is influenced by the variables included in the regression model. The Breusch–Pagan test examines the null hypothesis that the variance in errors is not influenced by the variables in the regression model. If the null hypothesis is rejected, it indicates the presence of heteroskedasticity (Greene, 2012, pp. 316–317).

Moreover, the presence of autocorrelation is an assumption that must be satisfied for linear regression. The Breusch–Godfrey serial correlation test is employed using the `'bgtest()'` function from the `'lmtest'` package. This test can be carried out by

examining whether there is a linear relationship between the residuals and their lagged values (Greene, 2012, p. 962).

Lastly, the normality of residuals is evaluated using the Jarque-Bera test, available in the `'tseries'` package. This test examines whether the skewness and kurtosis of the residuals match those of a normal distribution (Jarque & Bera, 1980). The null hypothesis states that the skewness and kurtosis of the data follow the expected values of a normal distribution. In addition, a normal quantile-quantile (Q-Q) plot is used to visually represent the normality of the residuals.

4.5 Portfolio Formation and Performance Evaluation

After the diagnostics stage, the significant variables obtained from the MG and POLS estimation were tested for their predictive power over the three-month forward return. A backtesting process was performed from January 2013 to December 2022 with quarterly rebalancing using Microsoft Excel. Two distinct portfolio formation processes were carried out, each focusing solely on the significant variables obtained from the MG and PMG estimations.

The portfolio formation process was performed using a method similar to the EM equity country selection approach introduced by Kortas et al. (2005). From January 2013 to December 2022, a comprehensive monthly ranking process was conducted for all 14 countries, which considered the observed values of the fundamental, economic, and technical indicators. This ranking was determined by transforming each observation of the respective indicator into a *z*-score. To ensure consistency, the observations for each country were transformed into *z*-scores following the same approach as described in Section 4.2. However, in this case, the transformation considered only observations from the last 10 years. For variables that exhibit a positive relationship with the three-month forward return according to the regression model, a descending-order ranking was used. Conversely, variables with a negative relationship were ranked in ascending order.

Countries were assigned points according to their monthly rankings in each variable. The country with the highest ranking in a specific variable was awarded 14 points, whereas the country with the lowest ranking received 1 point. These points were accumulated over three consecutive months to create quarterly scores for each indicator. The total score

obtained from the quarterly scores per variable and their summation across other variables enabled the formation of various ranking schemed portfolios, by considering either the total score of all indicator groups or focusing solely on the total scores of the fundamental, macroeconomic, and technical groups. At the beginning of each quarter, the top quintile countries (denoted as 'Overweight') were included as long positions in the equally weighted long portfolio, indicating a positive outlook. Similarly, the bottom quintile countries (denoted as 'Underweight') were selected for short positions in the long-short portfolio, indicating a negative outlook. As a result, the long-short portfolio included countries from both the top and bottom quintiles, with long positions in the top quintile and short positions in the bottom quintile.

The applied quintile methodology aimed to capture the long-term upside trend of equity markets. Therefore, countries within the top quintile were treated as separate entities, even if they had the same total score, resulting in a minimum of three or more long positions in each quarter. In contrast, for the bottom quintile, countries with the same total score were not treated as separate entities in the long-short portfolio, resulting in a maximum of three short positions each quarter, although occasionally fewer were included. Based on the cumulative total score over a three-month period, the backtesting strategy initiated its first portfolio formation at the end of the first quarter of 2013. The final portfolio formation was in December 2022, allowing to measure the portfolio's performance for the following three months until the end of March 2023. The performance of the constructed portfolios was measured against the benchmark, the MSCI EM index. In addition, the following risk-adjusted performance measures as suggested by Bodie et al. (2014, pp. 810 & 871) were analysed to gain insights into the relative performance and evaluate the risk characteristics of the constructed portfolios:

First, the Sharpe ratio quantifies the risk-adjusted return of the portfolio by calculating the ratio of the average portfolio return $\bar{r}_p$ minus the risk-free rate $\bar{r}_f$, divided by the portfolio's standard deviation σ_p. A Sharpe ratio above 1 indicates a good risk-adjusted performance, with returns being greater than the risk. The risk-free rate $\bar{r}_f$ is determined as the average annual yield of the three-month treasury bill [2] during the examined period.

[2] Data retrieved from the Federal Reserve Bank of St. Louis via https://fred.stlouisfed.org.

$$Sharpe\ ratio:\ \ S = \frac{\bar{r}_p - \bar{r}_f}{\sigma_p}$$

Second, Jensen's alpha α_P is a measure that evaluates the average portfolio return $\bar{r}_P$ relative to the predicted return based on the capital asset pricing model (CAPM). The CAPM is a widely used financial model that estimates the expected return of an asset based on its systematic risk, measured by β_P, and the average return of the market $\bar{r}_M$ (in this case, the MSCI EM Index). Jensen's alpha is derived by subtracting the predicted return based on the CAPM from the actual average return of the portfolio. It quantifies the excess return of the portfolio beyond what would be expected based on its systematic risk and market conditions. In the context of evaluating the constructed portfolio performance, a positive Jensen's alpha indicates that the portfolio has achieved a higher return than what would be predicted by the CAPM, suggesting outperformance. Conversely, a negative Jensen's alpha suggests underperformance, indicating that the portfolio has not met the expected return based on its risk exposure and market conditions.

$$Jensen's\ Alpha:\quad \alpha_P = \bar{r}_P - \left[\bar{r}_f + \beta_P\left(\bar{r}_M - \bar{r}_f\right)\right]$$

Third, the information ratio is the last metric used in this study to assess the performance of the constructed portfolios. It is calculated by dividing the portfolio's excess return compared to the benchmark, denoted as α_P, by the portfolio's tracking error $\sigma(e_P)$, which measures the non-systematic risk or volatility of the portfolio's residual returns. The tracking error captures the variability between the monthly returns of the portfolio and the monthly returns of the benchmark (in this case the MSCI EM Index). A low tracking error indicates that the portfolio's returns closely align with the MSCI EM Index. The information ratio, therefore, quantifies the degree of active management and the extent to which the portfolio deviates from the benchmark's performance. A high information ratio is considered favourable since it indicates that the portfolio has achieved a high level of risk-adjusted returns compared to its benchmark.

$$Information\ ratio:\quad \frac{\alpha_P}{\sigma(e_P)}$$

5 Empirical Results

This chapter presents the empirical results from the statistical analyses and backtesting strategy outlined in Chapter 4. The regression results and statistical diagnostics are presented first. This is followed by an examination of the portfolio formation process. Finally, the chapter analyses the performance of the constructed portfolios.

5.1 Regression Results and Findings

Table 4 reports the results of the MG estimation and pooled OLS for each data set. In Data Set 1, which looks at fundamentals after the GFC, the MG estimation reveals that only the EPS variable is statistically significant at the 1% significance level ($p < 0.01$), with a negative coefficient of -0.0410. In contrast, the POLS regression results indicate that EPS is highly statistically significant at the 0.1% level ($p < 0.001$), while the DPS and PS variables are also statistically significant at the 5% level ($p <0.05$). EPS and PS have negative effects on the three-month forward return of EM equities, while DPS has a positive impact.

In the results for Data Set 2, which examines the same variables but has an extended sample period with observations beginning in December 2006, the MG estimation shows significant results for PE, PB, and ROE variables at the 1% significance level. The POLS regression also indicates significance for PE at the 1% level, while PB and ROE display high significance at the 0.1% level. PE and ROE have a positive relationship with the future return of EM equities, while PB has a negative relationship. EPS and DPS are insignificant in both models, while PS has a marginal level of significance at the 10% level in the POLS regression.

In Data Set 3, the MG estimation reveals significant results for the macroeconomic variables GBS ($p < 0.001$), IP ($p < 0.01$) and CPI ($p < 0.05$), while the POLS regression shows high significance for GBS and CPI, both at the 0.01% level. The subsequent equity return in emerging markets is negatively affected by IP and CPI, whereas the coefficient for GBS shows a positive impact. IP and TB have marginal explanatory power in the POLS regression ($p < 0.1$) and CAI displays no level of significance in either model.

Data Set 1: Fundamentals (excluding GFC)

	MG				POLS			
Variable	Coefficient	Std. Error	*p*-value		Coefficient	Std. Error	*p*-value	
(Intercept)	0.0091	0.0027	0.0007	***	0.0091	0.0028	0.0010	**
PE	-0.0191	0.0392	0.6271		-0.0078	0.0055	0.1596	
PB	-0.0268	0.0350	0.4435		-0.0028	0.0058	0.6282	
EPS	-0.0410	0.0158	0.0093	**	-0.0175	0.0047	0.0002	***
DPS	0.0112	0.0093	0.2320		0.0079	0.0038	0.0368	*
PS	0.0051	0.0092	0.5741		-0.0103	0.0045	0.0227	*
ROE	0.0018	0.0308	0.9536		0.0031	0.0049	0.5193	

Data Set 2: Fundamentals (including GFC)

	MG				POLS			
Variable	Coefficient	Std. Error	*p*-value		Coefficient	Std. Error	*p*-value	
(Intercept)	0.0186	0.0021	0.0000	***	0.0186	0.0030	0.0000	***
PE	0.0408	0.0152	0.0073	**	0.0180	0.0069	0.0095	**
PB	-0.0603	0.0197	0.0022	**	-0.0244	0.0070	0.0005	***
EPS	-0.0063	0.0112	0.5729		-0.0047	0.0046	0.3080	
DPS	-0.0040	0.0109	0.7106		-0.0014	0.0040	0.7302	
PS	-0.0069	0.0089	0.4375		-0.0092	0.0050	0.0664	.
ROE	0.0375	0.0136	0.0058	**	0.0233	0.0055	0.0000	***

Data Set 3: Macroeconomics

	MG				POLS			
Variable	Coefficient	Std. Error	*p*-value		Coefficient	Std. Error	*p*-value	
(Intercept)	0.0164	0.0020	0.0000	***	0.0164	0.0032	0.0000	***
IP	-0.0085	0.0027	0.0018	**	-0.0068	0.0037	0.0693	.
CPI	-0.0227	0.0095	0.0163	*	-0.0161	0.0034	0.0000	***
TB	0.0047	0.0065	0.4708		0.0056	0.0032	0.0860	.
GBS	0.0281	0.0076	0.0002	***	0.0261	0.0035	0.0000	***
CAI	-0.0036	0.0046	0.4319		-0.0031	0.0035	0.3787	

Data Set 4: Technicals & Sentiment

	MG				PMG			
Variable	Coefficient	Std. Error	*p*-value		Coefficient	Std. Error	*p*-value	
(Intercept)	0.0337	0.0020	0.0000	***	0.0337	0.0024	0.0000	***
MA	0.0030	0.0064	0.6391		0.0099	0.0042	0.0183	*
MBR	0.0059	0.0080	0.4581		0.0078	0.0041	0.0591	.
RSI	-0.0147	0.0061	0.0155	*	-0.0208	0.0029	0.0000	***
ESPR	0.0070	0.0035	0.0453	*	0.0040	0.0025	0.1016	
CMD	0.0051	0.0100	0.6123		0.0081	0.0025	0.0011	**

Significance levels: *** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.1

Table 4: Mean Group Estimation and Pooled OLS Results

Lastly, in Data Set 4, the MG estimation indicates that the technical variables RSI and ESPR are both statistically significant at the 5% significance level. The POLS regression results show significance for RSI ($p < 0.001$), CMD ($p < 0.01$) and MA ($p < 0.05$), while MBR is not considered statistically significant ($p < 0.1$). MA and RSI imply a positive relationship on the three-month forward returns of EM equities, while ESPR correlates negatively.

The first observation was that the direction of the coefficients mostly aligns with the expected relationship between the variables and the three-month forward return. However, there are few cases where the observed relationship may require further examination or clarification to fully understand the underlying factors contributing to the results. The positive coefficients for PE and GBS as well as the negative coefficients for PB, EPS and CPI seem counterintuitive and require further interpretation. The positive coefficient for PE may reflect optimistic market sentiment, with EM investors even willing to pay a premium due to improved growth prospects. The positive coefficient for GBS indicates that in times of increased risk perception, participants demand higher returns on their equity investments. Therefore, when government bond spreads widen, equity returns tend to rise as investors demand higher returns to compensate for the increased risk. The negative relationship of PB and EPS on future equity returns may be explained by signs of overvaluation. However, these two variables would require further analysis. Finally, the negative coefficient on the CPI is largely explained by the fact that higher levels of inflation lead to central bank interest rate hikes, which have a negative impact on corporate profitability due to higher borrowing costs and lead to lower equity returns for investors.

The obtained results from MG estimation and POLS regression illustrate the level of heterogeneity in EM equities and the relationship between variables and future returns across various data countries. The first observation is that the POLS regression had a higher number of significant variables compared to the MG estimation. This suggests that the POLS regression, which assumes homogeneity and treats all countries as one large sample, was able to capture key determinants that impact future EM equity returns across countries more clearly than the MG estimation.

However, it is important to consider the goodness-of-fit measures, such as the R-squared values, to assess the quality of the models' fit to the data. The full regression output of the MG estimation in Appendix D indicates low multiple R-squared values (0.1510, 0.0911, 0.1259, and 0.1099) for the four data sets. Similarly, the R-squared values in the POLS regression in Appendix E (02742, 0.01946, 0.0534, and 0.02212), indicate a rather weak overall explanatory power of the independent variables in a homogeneous model. Overall, while the higher number of significant variables in the POLS regression indicates a broader capture of common factors, the relatively low R-squared values in both models imply that there might be other unaccounted factors or sources of variation that influence the future return of EM equities that are not captured by the included independent variables. Furthermore, the presence of heterogeneity among the countries within the dataset might introduce complexities and variations that are not fully captured by the models.

The low R-squared values highlight the need for further investigation and consideration of additional variables or model specifications to improve the model fit and capture the complexities of the relationship. A suitable complementary model may be the PMG estimation by Pesaran et al. (1999), as explained in Section 4.2. The PMG can capture a low degree of heterogeneity in the short term, which is the benefit of the MG estimator, while still benefiting from the criteria of imposing long-term homogeneity.

As explained in Section 4.4, an ADF test was conducted to assess the stationarity of the variables in different data sets. The results in Table 5 indicate that all variables show stationarity given their respective ADF statistics and *p*-values less than 0.01. The stationarity of the variables in each data set confirms their suitability for the applied MG and POLS methods.

Data Set 1: Fundamentals (excluding GFC)

Variable	ADF statistic	*p*-value
fwd_returns_3m	-12.4988	<0.01
PE	-6.6652	<0.01
PB	-7.0237	<0.01
EPS	-9.5802	<0.01
DPS	-7.0573	<0.01
PS	-6.8418	<0.01
ROE	-7.4984	<0.01

Data Set 2: Fundamentals (including GFC)

Variable	ADF statistic	*p*-value
fwd_returns_3m	-15.4587	<0.01
PE	-7.4196	<0.01
PB	-6.3435	<0.01
EPS	-7.7821	<0.01
DPS	-7.8048	<0.01
PS	-5.9786	<0.01
ROE	-7.3781	<0.01

Data Set 3: Macroeconomics

Variable	ADF statistic	*p*-value
fwd_returns_3m	-14.4229	<0.01
IP	-11.5106	<0.01
CPI	-6.9001	<0.01
TB	-6.7402	<0.01
GBS	-8.8710	<0.01
CAI	-11.9604	<0.01

Data Set 4: Technicals & Sentiment

Variable	ADF statistic	*p*-value
fwd_returns_3m	-15.8373	<0.01
MA	-13.9217	<0.01
MBR	-14.4224	<0.01
RSI	-8.9442	<0.01
ESPR	-14.8269	<0.01
CMD	-9.7249	<0.01

Table 5: Augmented Dickey–Fuller Test Results

The VIF test statistics, displayed in Table 6, apply to both the MG estimation and the POLS regression. The VIF values for the fundamental variables in Data Sets 1 and 2 ranged from 1.8883 to 4.3496 and 1.7537 to 5.2065 respectively, indicating a moderate level of multicollinearity. For the macroeconomic variables in Data Set 3, the VIF values were relatively low, ranging from 1.0496 to 1.3820, suggesting a low degree of multicollinearity. A similar low level of multicollinearity can be seen for Data Set 4, in which technical and sentiment variables have VIF values ranging from 1.0184 to 2.9369. Overall, the VIF test statistics indicate the presence of potential multicollinearity in the two fundamental data sets. However, the levels of multicollinearity are within an acceptable range, allowing these variables to be included in the regression models.

Data Set 1: Fundamentals excluding GFC

Variable	PE	PB	EPS	DPS	PS	ROE
VIF	4.0074	4.3496	2.8805	1.8883	2.6590	3.0805

Data Set 2: Fundamentals including GFC

Variable	PE	PB	EPS	DPS	PS	ROE
VIF	5.1528	5.2065	2.2358	1.7537	2.6913	3.2817

Data Set 3: Macroeconomics

Variable	IP	CPI	TB	GBS	CAI
VIF	1.3820	1.1357	1.0496	1.2270	1.2492

Data Set 4: Technicals and Sentiment

Variable	MA	MBR	RSI	ESPR	CMD
VIF	2.9369	2.8876	1.4516	1.0184	1.0193

Table 6: Variance Inflation Factor (VIF) Test Statistics

The results of the Breusch–Pagan test, shown in Table 7, apply to both the MG estimation and pooled OLS regression. The relatively large Breusch–Pagan (BP) test statistic and low *p*-value under consideration of the degrees of freedom (DF) indicate strong evidence to reject the null hypothesis in favour of the alternative hypothesis. This means that the assumption of constant variance of errors is violated and that there is significant heteroscedasticity in the models. The presence of heteroscedasticity in the regression models can impact the interpretation of the coefficient estimates. Heteroscedasticity violates the assumption of equal variance of errors across different levels of the independent variables, which can lead to inefficient and biassed coefficient estimates. Therefore, it is crucial to acknowledge the presence of heteroscedasticity and consider alternative methods to make valid inferences and draw meaningful conclusions from the regression analysis. As a result, this thesis acknowledges the potential impact of heteroscedasticity on the reliability of the results and interprets the findings with caution. Further steps, such as robust standard errors or weighted least squares estimation, may be necessary to address the issue of heteroscedasticity and obtain more accurate parameter estimates.

Data Set	BP Statistic	DF	*p*-value
Fundamentals (excluding GFC)	64.932	6	4.45E-12
Fundamentals (including GFC)	100.920	6	< 2.2e-16
Macroeconomics	80.291	5	7.29E-16
Technicals & Sentiment	102.580	5	< 2.2e-16

Table 7: Breusch-Pagan Test Results

The Breusch–Godfrey test results, displayed in Table 8, apply to both the MG estimation and the POLS regression. In all the datasets, the large Breusch–Godfrey (BG) test statistic coupled with the low *p*-value indicate a significant presence of serial correlation in the residuals. Therefore, there is strong evidence to reject the null hypothesis, indicating that the errors are correlated with their lagged values. This thesis acknowledges the presence of serial correlation and recognises its potential impact on the observed relationships in the models. As a result, it is essential to approach the interpretation of the findings with caution and consider the potential bias introduced by serial correlation in the model estimates.

Data Set	BG Statistic	DF	*p*-value
Fundamentals (excluding GFC)	724.910	1	< 2.2e-16
Fundamentals (including GFC)	1027.800	1	< 2.2e-16
Macroeconomics	950.820	1	< 2.2e-16
Technicals & Sentiment	1783.300	1	< 2.2e-16

Table 8: Breusch-Godfrey Test Results

The Jarque–Bera test statistic is denoted by chi-square χ^2, which follows the chi-square distribution. The test statistic, as presented in Table 9, is significantly large for all data sets in both the mean group estimation and the pooled OLS regression models, which indicates strong evidence to reject the null hypothesis of normality. In addition to the Jarque–Bera test, a Q-Q normal plot (see Figure 8) was conducted for the MG estimation, providing a visual representation of the non-normality in the distribution of residuals. The Q-Q plot confirms the deviation from normality. As a result, this thesis interprets the regression results with caution and recognises the potential implications of this non-normality on the reliability and validity of the findings.

	MG			POLS		
Data Set	χ^2	DF	*p*-value	χ^2	DF	*p*-value
Fundamentals (excl. GFC)	121.070	2	< 2.2e-16	197.810	2	< 2.2e-16
Fundamentals (incl. GFC)	408.620	2	< 2.2e-16	449.420	2	< 2.2e-16
Macroeconomics	189.150	2	< 2.2e-16	275.760	2	< 2.2e-16
Technicals & Sentiment	546.930	2	< 2.2e-16	448.070	2	< 2.2e-16

Table 9: Jarque-Bera Test Results

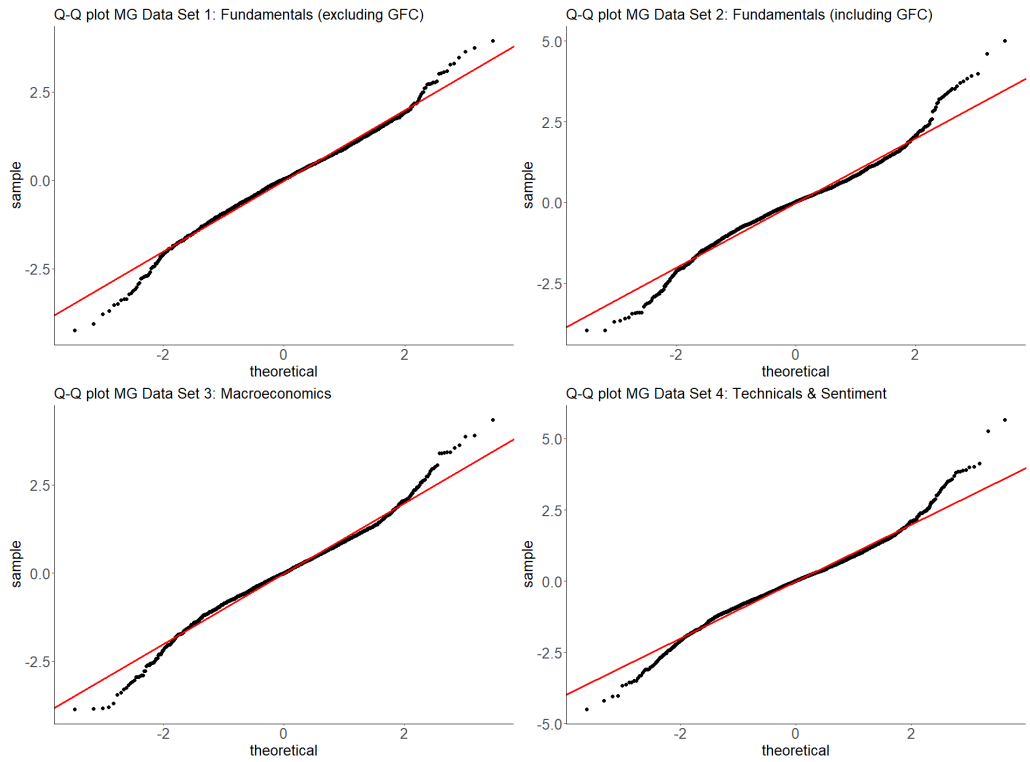

Figure 9: Normal Q-Q Plot of Residuals from Mean Group Estimation

5.2 Performance Analysis of Portfolios

The following section presents the results of the portfolio formation and the performance evaluation through backtesting over a ten-year period beginning in 2012. A variable had to be significant below the 5% level for inclusion in either the MGs or POLS portfolio. This means that only those variables that had a *p*-value of less than 0.05 in one of the four data sets of a given model were considered for portfolio modelling. Table 10 illustrates the selection of the variables.

The MG portfolios considered a total of four fundamental indicators (PE, PB, EPS, and ROE) as well as four macroeconomic and tactical indicators (CPI, GBS, RSI, and ESPR). Although IP showed significance at the 1% level by MG estimation, the variable could not be included, as Colombia and the Philippines had no observations before 2015 and 2018 respectively. The POLS portfolios considered all six fundamental variables (PE, PB, EPS, DPS, PS and ROE) and five macroeconomic and tactical variables (CPI, GBS, MA, RSI and CMD). CAI had no significance and confirms the findings of Hsu et al. (2022), that GDP is an unreliable predictor for future equity returns.

		Selected Variables for Portfolio Formation base on Significance Levels			
		MG Portfolio		POLS Portfolio	
		excl. GFC	*incl. GFC*	*excl. GFC*	*incl. GFC*
Fundamentals	PE (+)		**		**
	PB (-)		**		***
	EPS (-)	**		***	
	DPS (+)			*	
	PS (-)			*	.
	ROE (+)		**		***
Macroeconomic & Tactical	CPI (-)	*		***	
	GBS (+)	***		***	
	MA (+)			*	
	RSI (-)	*		***	
	CMD (+)			**	
	ESPR (+)	*			

		Omitted Variables Based on Significance Levels or Data Availability	
Macroeconomic & Tactical	IP (-)	**	.
	TB (+)		.
	CAI (-)		
	MBR (+)		

Significance levels: *** p < 0.001; ** p < 0.01; * p < 0.05; . p < 0.1

Table 10: Variable Selection for Portfolio Formation

Based on the coefficient relationships with the three-month forward return and the methodology outlined in Section 4.5, each variable observation per country was ranked monthly, with the highest ranked country receiving 14 points and the lowest ranked country receiving 1 point. These 120 monthly scores per country were then cumulated over three consecutive months to obtain 40 quarterly scores per country in each variable. The MG and POLS portfolios, which include long and long-short variations, were formed using three different ranking schemes: fundamentals, macroeconomic and technical indicators, as well as all attributes combined. A detailed country rating allocations for all portfolio variations are provided in Appendix F and G.

From March 2013 to January 2023, all MG long portfolios have outperformed the benchmark, as shown in Figure 10. Portfolios that included fundamentals had a cumulative total return of +79.4%. The inclusion of only macroeconomic and technical indicators (+35.27%) had slightly higher return than the MSCI EM index (+26.31%) but underperformed the benchmark from August 2020 to July 2022. The portfolio variation that included all scoring attributes had the highest return of +88.28%.

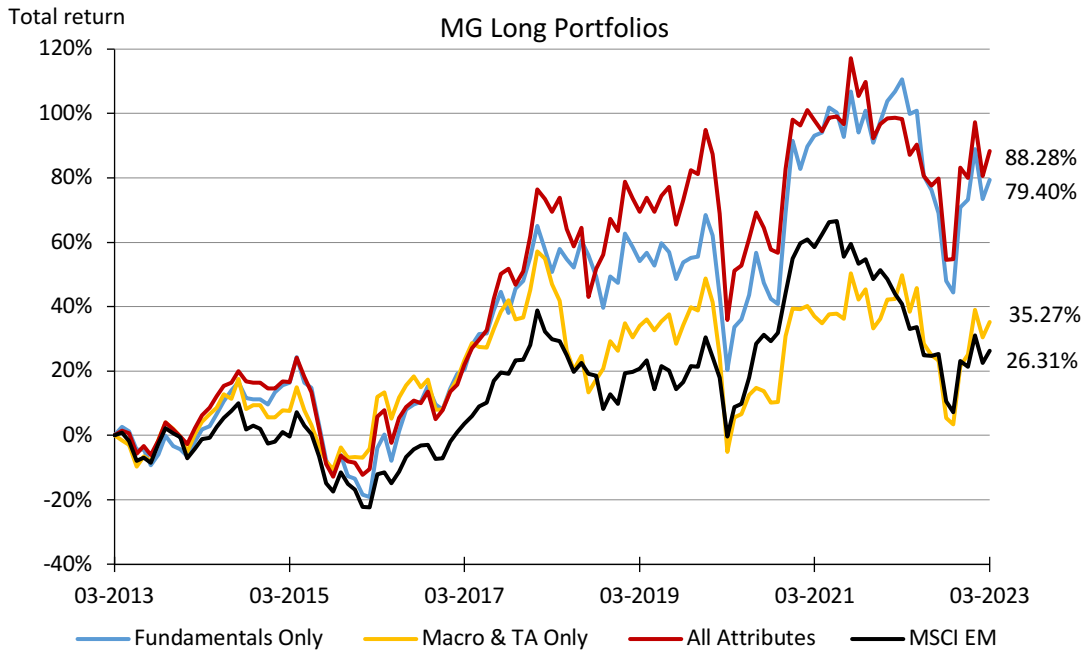

Figure 10: Historical Performance of MG Long Portfolios

The MG long-short portfolios shown in Figure 11 display that fundamental factors led to the highest return of (88.16%), followed by the inclusion of all variables (+80.73%), although the excess return was only generated since the onset of the pandemic in 2020. Macroeconomic and technical indicators (+38.19%) were able to slightly outperform the benchmark. The MG long-short portfolio also have considerably narrower swings compared to the MG long portfolio, indicating lower volatility. This suggests that the long-short strategy, which combines long positions from the top quintile and short positions from the bottom quintile, has the potential to reduce risk and provide more consistent performance over time.

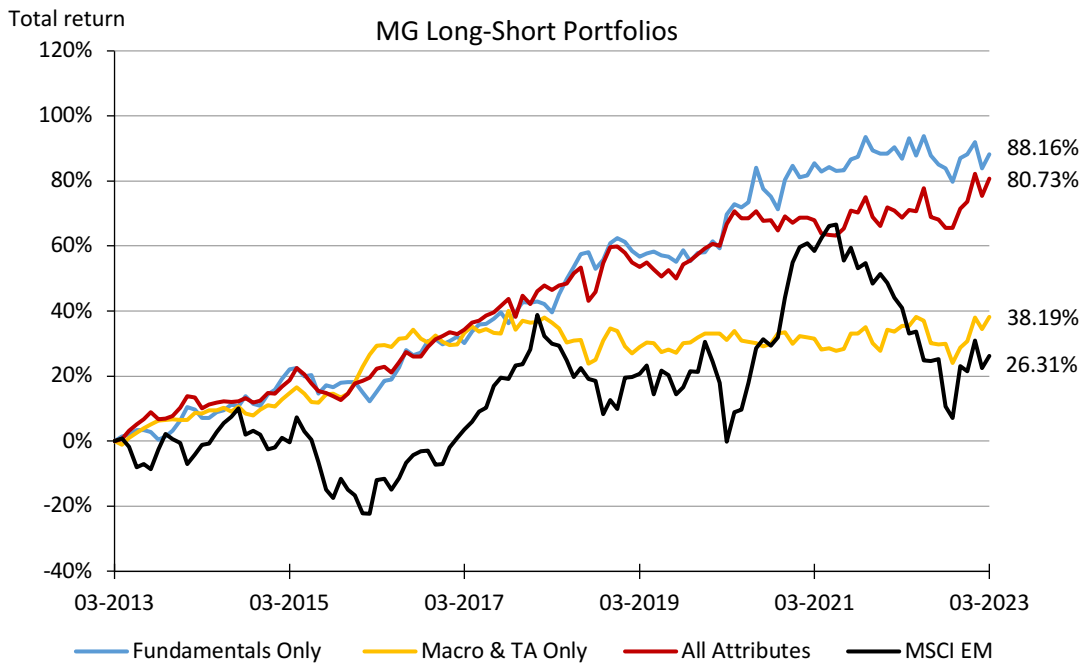

Figure 11: Historical Performance of MG Long-Short Portfolios

The POLS long portfolios in Figure 12 illustrate a higher performance dispersion. In the long-only variation, fundamental factors generated a total return of +171.01%, while the sole inclusion of macroeconomic and technical indicators led to a loss of -17.57%. The combination of all attributes resulted in a return of +87.66%.

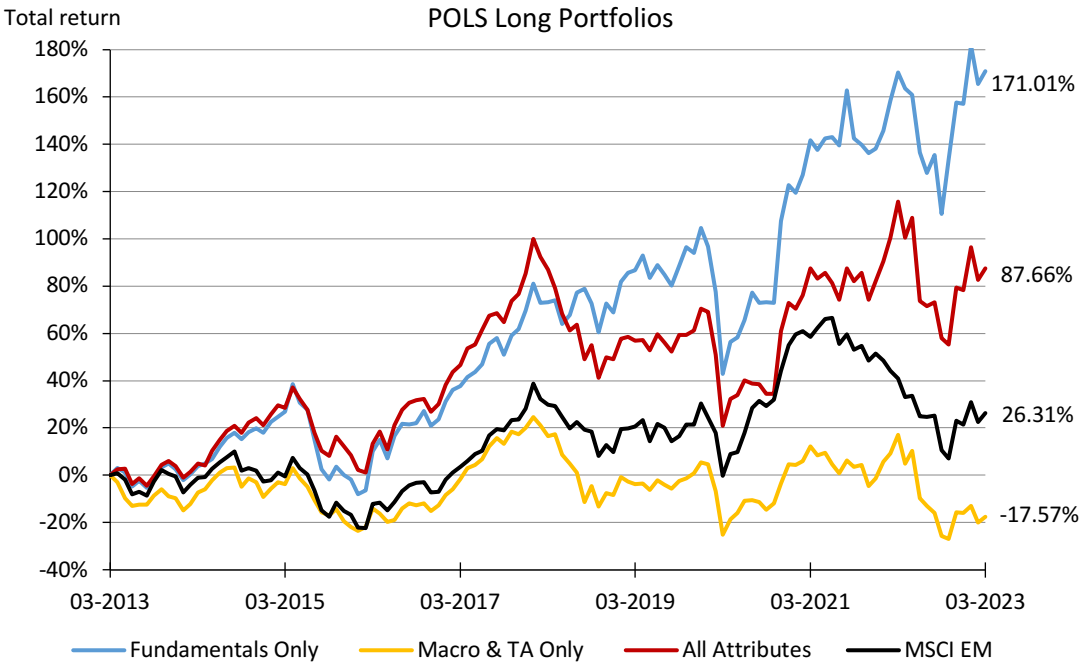

Figure 12: Historical Performance of POLS Long Portfolios

A similar pattern can be seen in the POLS long-short portfolio, as shown in Figure 13. The portfolio that considers only fundamental variables had the highest return (+117.86%), although the inclusion of short positions significantly reduces performance. The inclusion of short positions macroeconomic and tactical factors ranking scheme contributed positively, but the total return of +5.1% was still well below the benchmark.

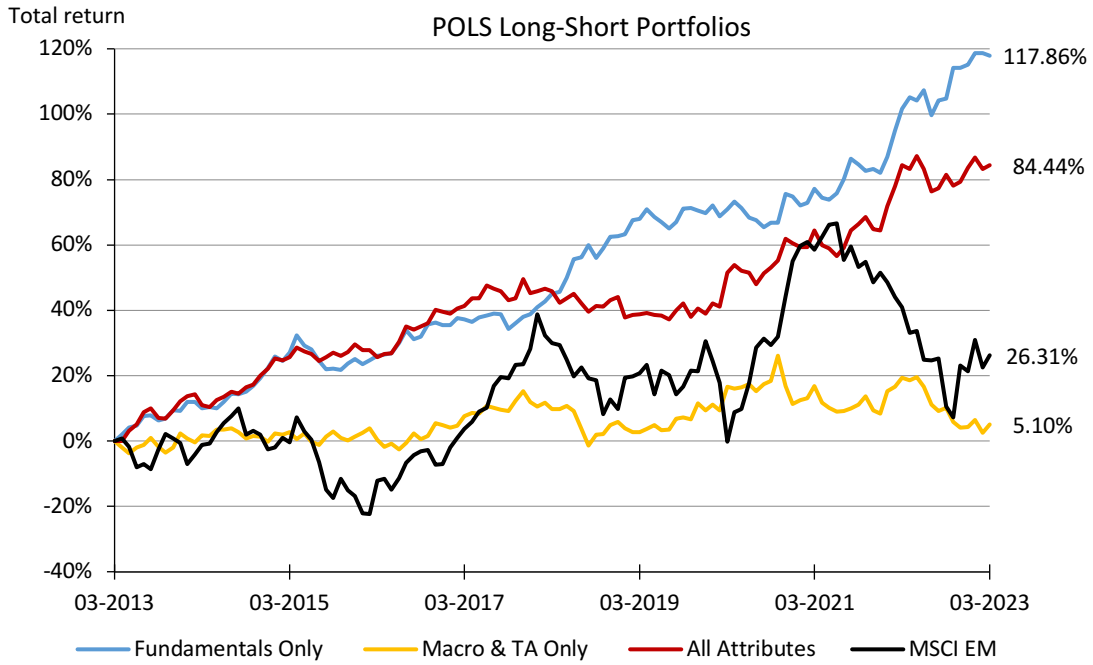

Figure 13: Historical Performance of POLS Long-Short Portfolios

The summarised performance analysis in Table 11 provides further information to evaluate the risk and return dynamics across all portfolio formations against the benchmark. The summary presents the annualised return under consideration of compounding effects, the portfolio returns during the best and worst month, the percentage of months in which the portfolio achieved a positive return, the annualised volatility, as well as the beta, which measures the sensitivity to changes in the benchmark. In addition, the risk-adjusted performance measures from Section 4.5 are presented.

The performance analysis of the portfolios reveals several key insights. To begin with, the six long-short portfolios had lower single-digit gains and losses during the best and worst months compared to the long portfolios, which experienced double-digit returns in these months. Consequently, the annualised volatility of the long-short portfolios was significantly lower.

In addition, all long-short portfolios had a higher percentage of positive months than the MSCI EM Index (55.83%), except for the POLS variation, which included macroeconomic and technical factors. Among the six long portfolios, only the Fundamentals POLS portfolio outperformed the benchmark in terms of percentage of positive months with a rate of 61.67%, while the other five variants either matched or underperformed the benchmark.

The annualised volatility of the long portfolios in both model variations was higher than the benchmark, with the MG estimation portfolios generally demonstrating higher volatility than the POLS portfolios. The higher volatility of the long portfolios is also reflected by a higher sensitivity to market movements, as indicated by their respective betas relative to the MSCI EM Index. The MG long portfolios have betas slightly above 1, indicating a higher sensitivity to market movements in the benchmark. Conversely, the POLS long portfolios have betas slightly below 1, suggesting a lower sensitivity to market movements in the benchmark. Furthermore, all long-short variations can be considered as market neutral portfolios, as their betas are close to 0.

Comparing the long portfolios, the five with positive annualised returns have higher Sharpe ratios than the MSCI EM Index, indicating superior risk-adjusted returns relative to the benchmark. In terms of long-short formations, the POLS portfolio with fundamental variables stands out with a Sharpe ratio of 1.226, while the POLS long-short portfolio with macroeconomic and technical indicators is the only one with a negative Sharpe ratio.

Among the long-only portfolios, the POLS formation which considered only fundamental factors had the highest risk-adjusted returns, reflected by a Sharpe ratio of 0.496, Jensen’s alpha of 8.21%, and an information ratio of 0.751. Similarly, within the set of long-short portfolios, the POLS portfolio that was constructed using fundamental factors only, generated superior risk-adjusted returns compared to the benchmark and other portfolio variations. The POLS long-short portfolio achieved a Sharpe ratio of 1.226, Jensen's alpha of 7.2% and an information ratio of 0.316.

MG Estimation	*Long Portfolio*			*Long-Short Portfolio*			*Benchmark*
	Fundamentals Only	Macro & TA Only	All Attributes	Fundamentals Only	Macro & TA Only	All Attributes	MSCI EM Index
Total return	79.40%	35.27%	88.28%	88.16%	38.19%	80.73%	26.31%
Annualised return	6.02%	3.07%	6.53%	6.53%	3.29%	6.10%	2.36%
Best month	20.03%	18.62%	18.46%	6.47%	5.70%	5.98%	14.85%
Worst month	-16.10%	-23.93%	-19.51%	-4.82%	-5.57%	-6.64%	-15.38%
Positive months (%)	55.83%	54.17%	55.83%	61.67%	56.67%	61.67%	55.83%
Annualised volatility	20.96%	21.07%	20.44%	7.39%	7.00%	7.04%	17.02%
Beta	1.089	1.038	1.036	0.050	0.040	0.029	1.000
Sharpe ratio	0.244	0.103	0.276	0.762	0.342	0.739	0.086
Jensen’s Alpha	3.53%	0.65%	4.12%	5.56%	2.33%	5.16%	0.00%
Tracking error	9.91%	11.49%	10.35%	17.76%	17.77%	17.96%	-
Information ratio	0.369	0.061	0.403	0.234	0.052	0.208	-

Pooled OLS	*Long Portfolio*			*Long-Short Portfolio*			*Benchmark*
	Fundamentals Only	Macro & TA Only	All Attributes	Fundamentals Only	Macro & TA Only	All Attributes	MSCI EM Index
Total return	171.01%	-17.57%	87.66%	117.86%	5.10%	84.44%	26.31%
Annualised return	10.48%	-1.91%	6.50%	8.10%	0.50%	6.31%	2.36%
Best month	19.93%	15.49%	19.93%	5.29%	6.58%	7.40%	14.85%
Worst month	-19.51%	-19.93%	-19.93%	-3.71%	-7.38%	-4.31%	-15.38%
Positive months (%)	61.67%	52.50%	55.83%	65.83%	52.50%	60.83%	55.83%
Annualised volatility	19.31%	19.06%	19.50%	5.87%	8.27%	6.62%	17.02%
Beta	0.942	0.903	0.952	-0.009	-0.131	-0.085	1.000
Sharpe ratio	0.496	-0.147	0.287	1.226	-0.048	0.819	0.086
Jensens Alpha	8.21%	-4.13%	4.20%	7.22%	-0.20%	5.54%	0.00%
Tracking error	10.81%	11.38%	10.86%	18.15%	20.84%	19.57%	-
Information ratio	0.751	-0.376	0.381	0.316	-0.089	0.202	-

Table 11: Portfolio Performance Analysis

6 Conclusion and Outlook

6.1 Summary of Findings

The study examines the drivers of country-specific EM equity index returns over the period 2013 to 2022. The results indicate that fundamental, macroeconomic, technical and sentiment indicators have varying impacts on three-month forward returns. Two different models, namely the mean group estimation (MG) and pooled OLS (POLS), were used to identify significant variables and to form a set of different equally-weighted portfolios that considered quarterly rebalancing.

Among the portfolio variants, those with long positions in countries ranked in the top quintile of fundamental indicators had the highest returns. In contrast, portfolios with long positions in countries ranked in the top quintile of macroeconomic and technical indicators failed to capture the relationship for consistently higher returns or even underperformed the benchmark. The results suggest that fundamental indicators were superior predictors of three-month forward returns for EM equities compared to macroeconomic and technical indicators, which is consistent with the existing literature (Hooker, 2004; Kortas et al., 2005, Hsu et al., 2022).

The MG long portfolio, consisting of countries with top quintile scores in four fundamental indicators (PE, PB, EPS, and ROE) returned 6.02% on an annualised basis. The POLS long portfolio included two additional significant variables (DPS and PS), which led to an increase in the annual rate of return to 10.48%. When short positions for countries in the bottom quintile of the six fundamental variables were included to create the POLS long-short portfolio, annualised returns fell to 8.1%. However, the inclusion of short positions considerably improved the Sharpe ratio to 1.226, compared to 0.496 in a long only portfolio.

6.2 Implications for Practice

The implications of the findings in this study can help to improve portfolio returns for fund managers, EM equity strategists or EM investors. Foremost, the study suggests that fundamental indicators play a crucial role in driving EM equity returns, highlighting their importance in the investment decision-making process. On the other hand, the study reveals that macroeconomic and technical indicators have limited predictive power in explaining EM equity returns.

As a result, a country selection approach based primarily on fundamental indicators could help practitioners in the field of EM to potentially generate higher returns, as these factors demonstrated stronger explanatory power compared to macroeconomic and technical indicators. A straightforward approach could be adopted, by using a scorecard for country selection and ranking the latest values of the six significant fundamental factors (PE, PB, ROE, EPS, DPS, and PS). By assigning appropriate weights and directions to these factors, practitioners can identify countries with strong fundamental characteristics that generate higher risk-adjusted investment returns. While the role of macroeconomic and technical analysis should not be completely disregarded, this study suggests that their relative importance in the investment decision-making process should be weighted lower.

In summary, the findings underscore the importance of fundamental indicators and provide practical guidance for EM equity investment practitioners. By adopting a country selection approach that prioritises fundamental factors, practitioners can potentially enhance their investment strategies and potentially achieve superior performance in EM equity markets.

6.3 Limitations of this Study

This thesis acknowledges several limitations in the analysis. Due to limited data availability, certain macroeconomic variables, as well as observations for current or historical constituents like Russia or Saudi Arabia, had to be excluded from the analysis. This resulted in both a reduced sample size and sample period. Furthermore, the counterintuitive coefficient directions observed in Section 5.1 were not further investigated. This lack of further investigation could raise concerns about the potential for misleading signals when ranking countries for future EM equity returns. In addition, the concept of transaction costs and short selling constraints was not considered in the backtesting strategy. Lastly, there are several limitations in the analysis due to violations of OLS assumptions detected during the statistical diagnostics stage in Section 5.2. These violations include potential issues of multicollinearity, autocorrelation, heteroscedasticity, and non-normality of the residuals. It is important to consider these limitations when interpreting the model results, while future research could focus on addressing these concerns.

6.4 Recommendations for Further Research

To further investigate the drivers of EM equity returns, it is recommended to incorporate observations from all current and historic members. Additional variables such as the Purchasing Managers Index (PMI), portfolio flows, and political risk indicators could also provide further insights. Future research could also consider exploring alternative econometric models and methodological approaches. One consideration is to construct an extensive data set and use stepwise regression, which can help to identify the most appropriate model by maximising the explained variance with a minimum number of variables. By reducing the number of predictors, issues such as multicollinearity (reflected in increased VIF) and heteroskedasticity could be addressed, as it affects the reliability of the model. Furthermore, methodologies such as PMG estimation and the random forest technique could be applied. Random forest in particular offers advantages in dealing with data availability issues, such as missing values or different frequencies of data for different variables. By using an ensemble of decision trees, the random forest algorithm can effectively deal with irregularities in the data set due to individual feature importance rankings. This could improve the accuracy and reliability of determining the key drivers of EM equity returns, especially given the varying data availability for EM economies.

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8 Appendix

Appendices A – F

Supplementary Data Files

The following two appendices were separately submitted:

Appendix A Excel Worksheets

1_raw_data_bloomberg.xlsx

2_values_bloomberg.xlsx

3_final_panel_with_z-score_transformation

4a_portfolio_formation_MG.xlsx

4b_portfolio_formation_POLS.xlsx

5a_portfolio_analysis_MG.xlsx

5b_portfolio_analysis_POLS.xlsx

6_additional_charts.xlsx

Appendix B R Studio panel data set and Script

dataset_rstudio.xlsx

dataset_rstudio.r

Appendix C

Scatterplots of Variables in the Data Sets

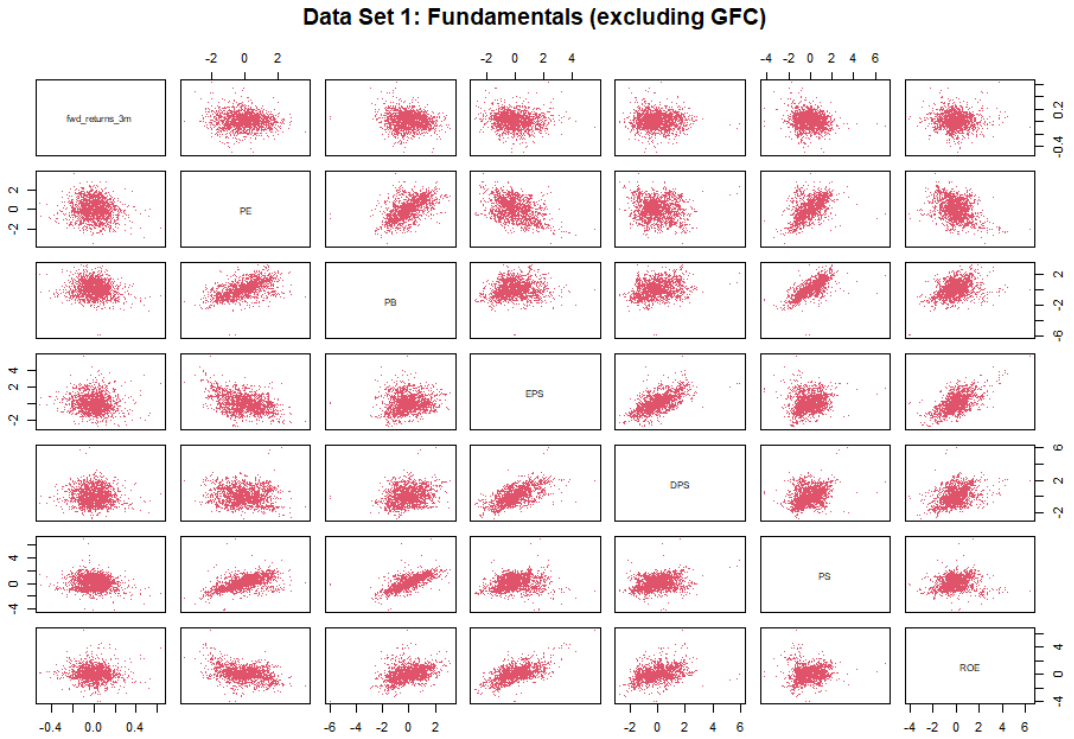

Figure 14: Scatterplot of Data Set 1 – Fundamentals (excluding GFC)

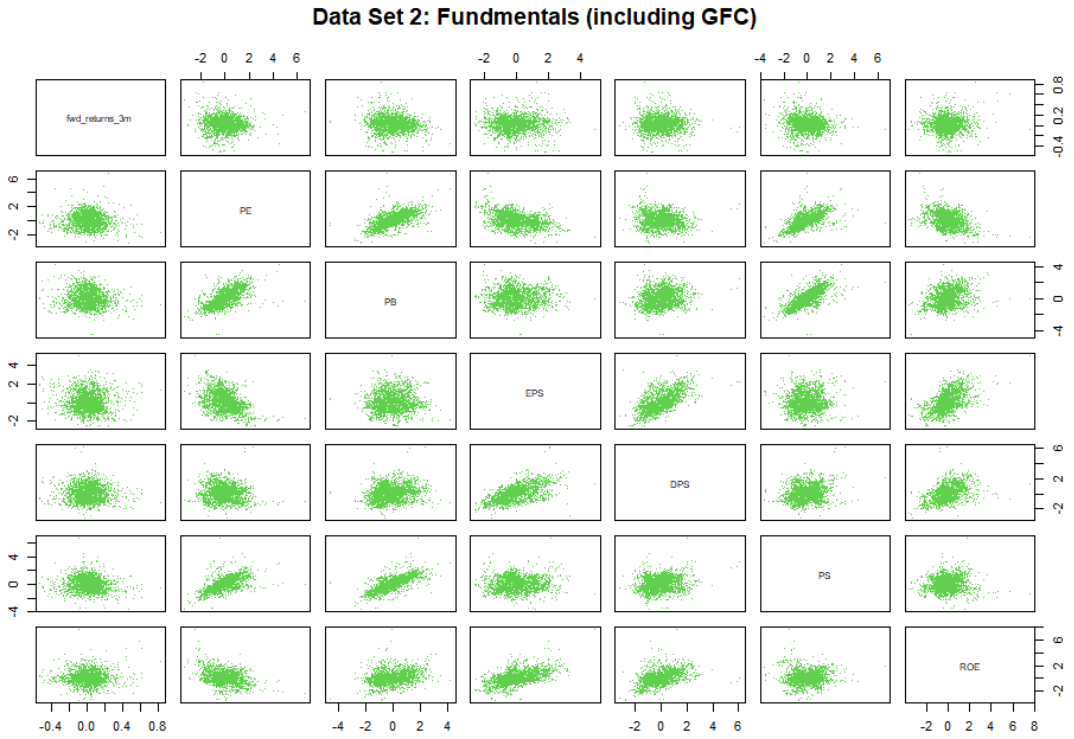

Figure 15: Scatterplot of Data Set 2 – Fundamentals (including GFC)

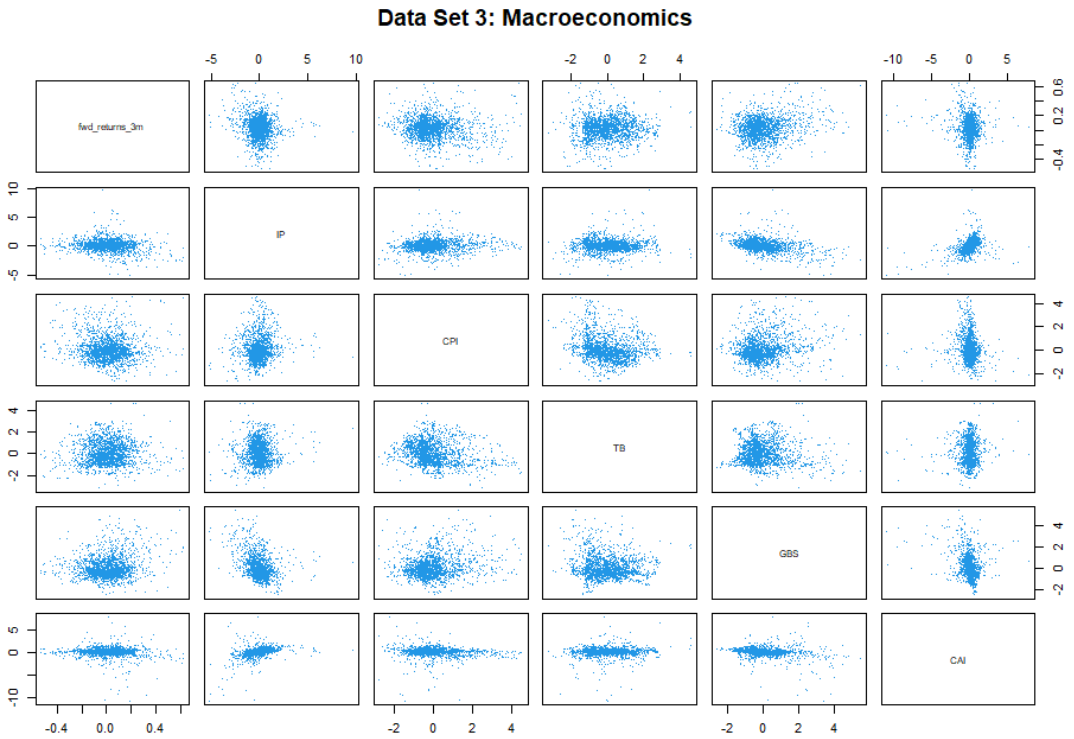

Figure 16: Scatterplot of Data Set 3 – Macroeconomics

Figure 17: Scatterplot of Data Set 4 – Technicals & Sentiment

Appendix D

Regression Results of the Mean Group Estimator

```
Data Set 1: Fundamentals (excluding GFC)

Mean Groups model

Balanced Panel: n = 14, T = 131, N = 1834

Residuals:
                Min.              1st            Median              3rd             Max
        -0.466451065   -0.065855651   0.004076285    0.068088433    0.434674381

Coefficients:
                            Estimate    Std. error        z-value       Pr(>|z|)
(Intercept)                0.0090541     0.0026625         3.4006      0.0006723  ***
PE                        -0.0190507     0.0392146        -0.4858      0.6271056
PB                        -0.0267828     0.0349531        -0.7662      0.4435279
EPS                       -0.0410026     0.0157658        -2.6007      0.0093024  **
DPS                        0.0111508     0.0093293         1.1952      0.2319908
PS                         0.0051428     0.0091505          0.562      0.5740979
ROE                        0.0017887     0.0307634         0.0581      0.9536337

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares: 26.167
Residual Sum of Squares: 22.215
Multiple R-squared: 0.15102
```

```
Data Set 2: Fundamentals (including GFC)

Mean Groups model

Balanced Panel: n = 11, T = 193, N = 2123

Residuals:
                Min.         1st Qu.            Median         3rd Qu.            Max.
        -0.53320353   -0.07641396    0.00388377    0.07437008    0.676085

Coefficients:
                            Estimate    Std. Error        z-value       Pr(>|z|)
(Intercept)                0.0185991     0.002063         9.0155      < 2.2e-16  ***
PE                         0.0408155     0.0152249        2.6808       0.007344  **
PB                        -0.0602885     0.0197334       -3.0552       0.002249  **
EPS                       -0.0063025     0.0111799       -0.5637       0.572937
DPS                       -0.0040336     0.0108709        -0.371       0.710604
PS                         -0.006915     0.0089064       -0.7764       0.437508
ROE                        0.0375304      0.013598          2.76        0.00578  **

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares: 42.482
Residual Sum of Squares: 38.613
Multiple R-squared: 0.091068
```

```
Data Set 3: Macroeconomics

Mean Groups model

Balanced Panel: n = 10, T = 193, N = 1930

Residuals:
                Min.          1st Qu.           Median          3rd Qu.
       -0.514870387  -0.079148199  -0.000238754   0.080120868
                Max.
        0.580187154

Coefficients:
                        Estimate     Std. Error        z-value       Pr(>|z|)
(Intercept)            0.0164187      0.0020243         8.1107       5.03E-16 ***
IP                    -0.0084649       0.002706        -3.1282      0.0017588 **
CPI                   -0.0227187      0.0094591        -2.4018      0.0163155 *
TB                     0.0047085      0.0065291         0.7212       0.470813
GBS                    0.0280747      0.0075744         3.7065      0.0002101 ***
CAI                   -0.0035996        0.00458        -0.7859      0.4319029

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares: 39.105
Residual Sum of Squares: 34.181
Multiple R-squared: 0.12591
```

```
Data Set 4: Technicals and Sentiment

Mean Groups model

Balanced Panel: n = 14, T = 240, N = 3360

Residuals:
                Min.          1st Qu.           Median          3rd Qu.
       -0.604991894  -0.079973059   0.001412265   0.077432005
                Max.
        0.762463792

Coefficients:
                        Estimate     Std. Error        z-value       Pr(>|z|)
(Intercept)            0.0337214       0.001988        16.9621        < 2e-16 ***
MA                     0.0029863      0.0063671          0.469        0.63905
MBR                    0.0059329      0.0079956          0.742        0.45807
RSI                   -0.0146789      0.0060636        -2.4208        0.01549 *
ESPR                   0.0070497      0.0035212         2.0021        0.04528 *
CMD                    0.0050568      0.0099781         0.5068         0.6123


Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares: 68.276
Residual Sum of Squares: 60.774
Multiple R-squared: 0.10988
```

Appendix E

Regression Results of the Pooled OLS

```
Data Set 1: Fundamentals (excluding GFC)

Pooling Model

Balanced Panel: n = 14, T = 131, N = 1834

Residuals:
         Min.       1st Qu.        Median      3rd Qu.          Max.
   -0.5060415   -0.0725158     0.0045916   0.0710414     0.6110687

Coefficients:
                   Estimate    Std. Error     t-value      Pr(>|t|)
(Intercept)       0.0090541     0.0027559      3.2853     0.0010379  **
PE               -0.0077925     0.0055381     -1.4071     0.1595752
PB               -0.0027949     0.0057697     -0.4844     0.6281513
EPS              -0.0175482     0.0046953     -3.7374     0.0001917  ***
DPS               0.0079435     0.0038016      2.0895     0.0367983  *
PS               -0.0102855     0.0045112       -2.28     0.0227219  *
ROE               0.0031297     0.0048556      0.6446     0.5192932

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    26.167
Residual Sum of Squares: 25.449
R-Squared:      0.027419
Adj. R-Squared: 0.024225
F-statistic: 8.58439 on 6 and 1827 DF, p-value: 3.1758e-09
```

```
Data Set 2: Fundamentals (including GFC)

Pooling Model

Balanced Panel: n = 11, T = 193, N = 2123

Residuals:
         Min.       1st Qu.        Median      3rd Qu.          Max.
    -0.536771   -0.0764035     0.0063568   0.0780839     0.7645415

Coefficients:
                   Estimate    Std. Error     t-value      Pr(>|t|)
(Intercept)       0.0185991     0.0030451      6.1079     1.20E-09  ***
PE                0.0179776     0.0069303      2.5941     0.0095498  **
PB               -0.0244369     0.0069663     -3.5079     0.0004611  ***
EPS              -0.0046547      0.004565     -1.0196     0.3080182
DPS              -0.0013946      0.004043     -0.3449     0.7301671
PS               -0.0091978     0.0050085     -1.8364     0.0664342  .
ROE               0.0232884     0.0055307      4.2108      2.65E-05  ***

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    42.482
Residual Sum of Squares: 41.655
R-Squared:      0.019464
Adj. R-Squared: 0.016684
F-statistic: 7.00071 on 6 and 2116 DF, p-value: 2.1735e-07
```

```
Data Set 3: Macroeconomics

Pooling Model

Balanced Panel: n = 10, T = 193, N = 1930

Residuals:
                     Min.   1st Qu.     Median   3rd Qu.      Max.
                -0.609665  0.003617  0.082057  0.63927

Coefficients:
                                      Estimate     Std. Error   t-value  Pr(>|t|)
(Intercept)                        0.016418 7   0.003157 4    5.2001  2.20E-07 ***
IP                                 -0.006764 4  0.003721 3   -1.8177   0.06926 .
CPI                                -0.016144    0.003373 6   -4.7855  1.84E-06 ***
TB                                  0.005571 5  0.003243 1    1.718   0.08597 .
GBS                                 0.026117 9  0.003506 5    7.4485  1.42E-13 ***
CAI                                -0.003115 4  0.003538 1   -0.8805   0.37868

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    39.105
Residual Sum of Squares: 37.018
R-Squared:      0.053382
Adj. R-Squared: 0.050922
F-statistic: 21.6997 on 5 and 1924 DF, p-value: < 2.22e-16
```

```
Data Set 4: Technicals and Sentiment

Pooling Model

Balanced Panel: n = 14, T = 240, N = 3360

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-0.5399664 -0.0821654 -0.0018173  0.0765911  0.7990256

Coefficients:
             Estimate Std. Error t-
value  Pr(>|t|)                          Estimate     Std. Error   t-value  Pr(>|t|)
(Intercept)                        0.033721 4   0.002434   13.8541        < 2.2e-16 ***
MA                                 0.009865 7    0.00418    2.3602  0.018321 *
MBR                                0.007825 5   0.004144 7    1.888  0.059106 .
RSI                                -0.020760 4  0.002938 7   -7.0644  1.95E-12 ***
ESPR                               0.004030 2   0.002461 4    1.6374  0.101647
CMD                                0.008069 4   0.002462 6    3.2768  0.001061 **

Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares:    68.276
Residual Sum of Squares: 66.766
R-Squared:      0.022123
Adj. R-Squared: 0.020665
F-statistic: 15.1756 on 5 and 3354 DF, p-value: 9.0126e-15
```

Appendix F

Quarterly Portfolio Allocations Based on Mean Group Estimator

Fundamentals Only

Date	Quarter	Brazil	Chile	China	Colombia	India	Malaysia	Mexico	Philippines	Poland	South Africa	South Korea	Taiwan	Thailand	Turkey	TOTAL OW	TOTAL UW
29.03.13	1	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
28.06.13	2	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	3	3
30.09.13	3	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
31.12.13	4	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
31.03.14	5	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Overweight	Neutral	Neutral	3	3
30.06.14	6	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
30.09.14	7	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Overweight	Underweight	Underweight	3	3
31.12.14	8	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Overweight	Underweight	Underweight	3	2
31.03.15	9	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Underweight	3	3
30.06.15	10	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	3	1
30.09.15	11	Overweight	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	4	2
31.12.15	12	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Underweight	Underweight	4	3
31.03.16	13	Overweight	Overweight	Neutral	Underweight	Neutral	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	3	3
30.06.16	14	Overweight	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
30.09.16	15	Overweight	Neutral	Overweight	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	3	3
30.12.16	16	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Overweight	Underweight	Neutral	3	3
31.03.17	17	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Underweight	Neutral	3	3
30.06.17	18	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Overweight	Underweight	Overweight	Underweight	Neutral	3	3
29.09.17	19	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	Underweight	3	3
29.12.17	20	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	3	3
30.03.18	21	Neutral	Underweight	Overweight	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	3	3
29.06.18	22	Neutral	Underweight	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	3	3
28.09.18	23	Neutral	Underweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	3	3
31.12.18	24	Overweight	Underweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	3	3
29.03.19	25	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	3	3
28.06.19	26	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Overweight	Overweight	Underweight	Neutral	3	3
30.09.19	27	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	3	3
31.12.19	28	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	3	3
31.03.20	29	Neutral	Overweight	Neutral	Underweight	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	3	3
30.06.20	30	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	3	1
30.09.20	31	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	3	3
31.12.20	32	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	3	2
31.03.21	33	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Underweight	Overweight	Neutral	3	3
30.06.21	34	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	3	3
30.09.21	35	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	3	3
31.12.21	36	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	3	3
31.03.22	37	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	3	2
30.06.22	38	Neutral	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	3	3
30.09.22	39	Neutral	Underweight	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	3	3
30.12.22	40	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Underweight	3	3

Table 12: Quarterly Portfolio Allocations – MG Fundamentals Only

Macroeconomics & Technicals Only

Date	Quarter	Brazil	Chile	China	Colombia	India	Malaysia	Mexico	Philippines	Poland	South Africa	South Korea	Taiwan	Thailand	Turkey	TOTAL OW	TOTAL UW
29.03.13	1	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Underweight	3	3
28.06.13	2	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Overweight	Underweight	Overweight	Neutral	Neutral	Neutral	3	3
30.09.13	3	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	3	3
31.12.13	4	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	4	3
31.03.14	5	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	3	3
30.06.14	6	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Underweight	Neutral	3	3
30.09.14	7	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	3	3
31.12.14	8	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Overweight	Overweight	Neutral	Underweight	3	3
31.03.15	9	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Underweight	3	3
30.06.15	10	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Overweight	Neutral	Overweight	Underweight	3	3
30.09.15	11	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Underweight	3	3
31.12.15	12	Overweight	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	3	3
31.03.16	13	Overweight	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	3	3
30.06.16	14	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Underweight	3	3
30.09.16	15	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Underweight	3	3
30.12.16	16	Underweight	Neutral	Underweight	Neutral	Neutral	Overweight	Overweight	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	3	3
31.03.17	17	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	Neutral	3	3
30.06.17	18	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	3	2
29.09.17	19	Overweight	Underweight	Underweight	Overweight	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	3	3
29.12.17	20	Overweight	Neutral	Underweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	3	3
30.03.18	21	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	3	3
29.06.18	22	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Underweight	Overweight	3	2
28.09.18	23	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	3	3
31.12.18	24	Underweight	Neutral	Neutral	Underweight	Overweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	3	3
29.03.19	25	Underweight	Neutral	Neutral	Underweight	Overweight	Overweight	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	3	3
28.06.19	26	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	3	3
30.09.19	27	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Underweight	Neutral	3	3
31.12.19	28	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Underweight	Neutral	3	3
31.03.20	29	Underweight	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	3	3
30.06.20	30	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Underweight	3	3
30.09.20	31	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Underweight	Overweight	Underweight	Neutral	Overweight	Neutral	3	3
31.12.20	32	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Neutral	Overweight	Overweight	3	3
31.03.21	33	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	3	3
30.06.21	34	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Underweight	Overweight	Overweight	3	3
30.09.21	35	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Overweight	4	2
31.12.21	36	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	3	3
31.03.22	37	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	3	3
30.06.22	38	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	3	3
30.09.22	39	Neutral	Underweight	Overweight	Overweight	Underweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	3	3
30.12.22	40	Neutral	Underweight	Overweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	3	3

Table 13: Quarterly Portfolio Allocations – MG Macro & Technicals Only

All Attributes

Date	Quarter	Brazil	Chile	China	Colombia	India	Malaysia	Mexico	Philippines	Poland	South Africa	South Korea	Taiwan	Thailand	Turkey	TOTAL OW	TOTAL UW
29.03.13	1	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Overweight	Neutral	Underweight	3	3
28.06.13	2	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	3	3
30.09.13	3	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Overweight	Underweight	Underweight	3	3
31.12.13	4	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Overweight	Underweight	Underweight	3	3
31.03.14	5	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	3	3
30.06.14	6	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Neutral	Underweight	Neutral	Overweight	Underweight	Neutral	3	3
30.09.14	7	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Underweight	Overweight	Overweight	Underweight	Neutral	3	3
31.12.14	8	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	Overweight	Underweight	Underweight	3	3
31.03.15	9	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Underweight	Overweight	Overweight	Neutral	Underweight	4	3
30.06.15	10	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	3	3
30.09.15	11	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Underweight	3	3
31.12.15	12	Overweight	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	3	3
31.03.16	13	Overweight	Overweight	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	3	3
30.06.16	14	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
30.09.16	15	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
30.12.16	16	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	Neutral	3	3
31.03.17	17	Neutral	Underweight	Overweight	Neutral	Overweight	Underweight	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	4	3
30.06.17	18	Overweight	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Overweight	Underweight	4	3
29.09.17	19	Overweight	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	3	3
29.12.17	20	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Neutral	Overweight	Underweight	Overweight	Neutral	Neutral	3	3
30.03.18	21	Overweight	Underweight	Overweight	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	4	2
29.06.18	22	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Overweight	3	3
28.09.18	23	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	3	3
31.12.18	24	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	3	3
29.03.19	25	Underweight	Neutral	Neutral	Neutral	Overweight	Overweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	3	3
28.06.19	26	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	3	3
30.09.19	27	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Overweight	Overweight	Underweight	Neutral	3	3
31.12.19	28	Neutral	Overweight	Neutral	Underweight	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	3	3
31.03.20	29	Underweight	Overweight	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	3	3
30.06.20	30	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Underweight	4	3
30.09.20	31	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Underweight	Neutral	Overweight	Neutral	3	3
31.12.20	32	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Overweight	3	3
31.03.21	33	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	3	3
30.06.21	34	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Overweight	3	3
30.09.21	35	Underweight	Neutral	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Overweight	4	3
31.12.21	36	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Overweight	3	3
31.03.22	37	Underweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	3	3
30.06.22	38	Neutral	Underweight	Overweight	Neutral	Underweight	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	3	3
30.09.22	39	Neutral	Underweight	Overweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	3	3
30.12.22	40	Neutral	Underweight	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Underweight	3	3

Table 14: Quarterly Portfolio Allocations – MG All Attributes

Appendix G

Quarterly Portfolio Allocations Based on Pooled OLS

Fundamentals Only

Date	Quarter	Brazil	Chile	China	Colombia	India	Malaysia	Mexico	Philippines	Poland	South Africa	South Korea	Taiwan	Thailand	Turkey	TOTAL OW	TOTAL UW
29.03.13	1	Neutral	Underweight	Overweight	Neutral	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	4	3
28.06.13	2	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
30.09.13	3	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
31.12.13	4	Underweight	Underweight	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
31.03.14	5	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Overweight	Neutral	3	3
30.06.14	6	Neutral	Underweight	Overweight	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	3	3
30.09.14	7	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	3	3
31.12.14	8	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	3	3
31.03.15	9	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Underweight	4	3
30.06.15	10	Overweight	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	3	3
30.09.15	11	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	3	3
31.12.15	12	Overweight	Overweight	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	3	3
31.03.16	13	Overweight	Overweight	Overweight	Underweight	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	3	3
30.06.16	14	Neutral	Overweight	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	3	3
30.09.16	15	Neutral	Overweight	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	Neutral	3	3
30.12.16	16	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Neutral	Overweight	Underweight	Neutral	3	3
31.03.17	17	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	3	3
30.06.17	18	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	3	3
29.09.17	19	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Underweight	Overweight	Neutral	Neutral	3	3
29.12.17	20	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Overweight	Underweight	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	4	3
30.03.18	21	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
29.06.18	22	Neutral	Underweight	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
28.09.18	23	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	3	3
31.12.18	24	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	Overweight	Neutral	Neutral	3	2
29.03.19	25	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
28.06.19	26	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	3	3
30.09.19	27	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Overweight	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	3	3
31.12.19	28	Underweight	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	3	3
31.03.20	29	Underweight	Overweight	Underweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	3	3
30.06.20	30	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	3	3
30.09.20	31	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	3	3
31.12.20	32	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	3	3
31.03.21	33	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	Neutral	3	3
30.06.21	34	Underweight	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	3	3
30.09.21	35	Neutral	Overweight	Underweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Overweight	Neutral	3	3
31.12.21	36	Overweight	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	3	3
31.03.22	37	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	3	3
30.06.22	38	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Overweight	3	3
30.09.22	39	Overweight	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Neutral	Neutral	3	3
30.12.22	40	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Underweight	Neutral	3	3

Table 15: Quarterly Portfolio Allocations – POLS Fundamentals Only

Macroeconomics & Technicals Only

Date	Quarter	Brazil	Chile	China	Colombia	India	Malaysia	Mexico	Philippines	Poland	South Africa	South Korea	Taiwan	Thailand	Turkey	TOTAL OW	TOTAL UW
29.03.13	1	Neutral	Overweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	3	3
28.06.13	2	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	Underweight	Neutral	3	3
30.09.13	3	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Overweight	Underweight	Underweight	3	3
31.12.13	4	Overweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	4	3
31.03.14	5	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Underweight	Neutral	3	3
30.06.14	6	Neutral	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Overweight	3	3
30.09.14	7	Neutral	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	Underweight	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	3	3
31.12.14	8	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	3	3
31.03.15	9	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Overweight	Overweight	Neutral	Neutral	3	3
30.06.15	10	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Overweight	Overweight	Neutral	Underweight	3	3
30.09.15	11	Underweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Overweight	Neutral	3	3
31.12.15	12	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Overweight	Overweight	Neutral	3	3
31.03.16	13	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Underweight	Overweight	Neutral	Overweight	Underweight	3	3
30.06.16	14	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Overweight	Underweight	3	2
30.09.16	15	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Overweight	Underweight	3	2
30.12.16	16	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Underweight	Overweight	Underweight	Neutral	Neutral	Overweight	Neutral	4	3
31.03.17	17	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Overweight	Neutral	3	3
30.06.17	18	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Overweight	Overweight	Neutral	4	3
29.09.17	19	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	2
29.12.17	20	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Underweight	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Overweight	3	3
30.03.18	21	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Underweight	Overweight	3	2
29.06.18	22	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Underweight	Underweight	Overweight	3	3
28.09.18	23	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	3	3
31.12.18	24	Neutral	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	3	3
29.03.19	25	Underweight	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	3	3
28.06.19	26	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
30.09.19	27	Neutral	Underweight	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	3	3
31.12.19	28	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	3	2
31.03.20	29	Underweight	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	3	3
30.06.20	30	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	3	3
30.09.20	31	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	Overweight	Neutral	Underweight	3	3
31.12.20	32	Neutral	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	3	3
31.03.21	33	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Overweight	Underweight	Neutral	Overweight	Neutral	3	3
30.06.21	34	Neutral	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
30.09.21	35	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Overweight	3	3
31.12.21	36	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
31.03.22	37	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Overweight	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
30.06.22	38	Neutral	Neutral	Overweight	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
30.09.22	39	Overweight	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
30.12.22	40	Neutral	Underweight	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	3	3

Table 16: Quarterly Portfolio Allocations – POLS Macro & Technicals Only

All Attributes

Date	Quarter	Brazil	Chile	China	Colombia	India	Malaysia	Mexico	Philippines	Poland	South Africa	South Korea	Taiwan	Thailand	Turkey	TOTAL OW	TOTAL UW
29.03.13	1	Underweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Overweight	Underweight	Underweight	3	3
28.06.13	2	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	3	3
30.09.13	3	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Underweight	Underweight	3	3
31.12.13	4	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	3	3
31.03.14	5	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	3	3
30.06.14	6	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	3	3
30.09.14	7	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	3	3
31.12.14	8	Neutral	Neutral	Overweight	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	3	3
31.03.15	9	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	3	3
30.06.15	10	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Overweight	Overweight	Underweight	3	2
30.09.15	11	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Underweight	Overweight	Overweight	Overweight	Underweight	3	3
31.12.15	12	Neutral	Overweight	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Underweight	3	3
31.03.16	13	Overweight	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	3	3
30.06.16	14	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	Overweight	Neutral	Underweight	3	3
30.09.16	15	Neutral	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	Overweight	Neutral	Underweight	3	3
30.12.16	16	Underweight	Neutral	Underweight	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
31.03.17	17	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	Neutral	Overweight	Neutral	Neutral	3	3
30.06.17	18	Neutral	Underweight	Neutral	Underweight	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	3	3
29.09.17	19	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	Underweight	3	3
29.12.17	20	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Underweight	Overweight	Underweight	Overweight	5	3
30.03.18	21	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Overweight	Underweight	Overweight	3	2
29.06.18	22	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Neutral	Overweight	Underweight	Overweight	3	3
28.09.18	23	Neutral	Underweight	Neutral	Neutral	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Underweight	Overweight	3	3
31.12.18	24	Underweight	Underweight	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	3	3
29.03.19	25	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Neutral	Neutral	Overweight	Neutral	Overweight	3	3
28.06.19	26	Underweight	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	3	3
30.09.19	27	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	3	3
31.12.19	28	Underweight	Neutral	Neutral	Underweight	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Overweight	3	3
31.03.20	29	Underweight	Overweight	Underweight	Underweight	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	Overweight	Neutral	Neutral	Neutral	3	3
30.06.20	30	Underweight	Neutral	Neutral	Underweight	Neutral	Neutral	Overweight	Overweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	3	3
30.09.20	31	Neutral	Overweight	Underweight	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	3	3
31.12.20	32	Neutral	Overweight	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Underweight	Overweight	Neutral	3	3
31.03.21	33	Neutral	Overweight	Neutral	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Neutral	Underweight	Underweight	Overweight	Neutral	3	3
30.06.21	34	Neutral	Neutral	Underweight	Overweight	Neutral	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	3	3
30.09.21	35	Neutral	Neutral	Neutral	Overweight	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Overweight	Neutral	3	3
31.12.21	36	Neutral	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
31.03.22	37	Neutral	Neutral	Neutral	Overweight	Underweight	Overweight	Neutral	Overweight	Neutral	Neutral	Underweight	Underweight	Neutral	Neutral	3	3
30.06.22	38	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
30.09.22	39	Overweight	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	Neutral	Neutral	Overweight	Underweight	Underweight	Neutral	Neutral	3	3
30.12.22	40	Overweight	Underweight	Overweight	Neutral	Underweight	Neutral	Overweight	Neutral	Neutral	Overweight	Neutral	Underweight	Neutral	Neutral	4	3

Table 17: Quarterly Portfolio Allocations – POLS All Attributes