Assessing the effectiveness of momentum-based investment strategies and relation to macroeconomic risk in the stock exchanges of South Africa, Mauritius and Egypt

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Abstract

This thesis investigates the effectiveness of long-term momentum investing strategies in the Markets of South Africa, Egypt, Mauritius and the Netherlands using data from 2009 until 2019 by replicating the paper by Griffin, Ji and Martin (2003). It finds overwhelmingly positive returns resulting from long-term momentum investment strategies in all markets except Egypt, while also documenting significant reversals in all markets except for South Africa. The thesis also investigates the relationship between macroeconomic risk caused by different economic states based on GDP growth and momentum and finds a significant relationship only in the case of Egypt.

Introduction

This section outlines the motivations of writing this thesis and states the main objectives of the thesis, its main research question, the hypotheses that will be tested, followed by a brief summary of the findings.

Momentum is a widely studied anomaly in the stock market and to this day remains a hot topic in finance literature. The momentum phenomenon refers to the relationship between past performance of companies and their future returns. Namely, stocks which have performed well in the past are expected to continue performing well in the future, while stocks which had poor past performance continue performing poorly. The well performing stocks are often referred to as winners, while poorly performing stocks are referred to as losers. Jegadeesh and Titman (1993) find evidence in the US stock market that in the short term 3-12 months after portfolio formation that winner stocks keep on winning while the losers kept on losing. On the other hand, De Bondt and Thaler (1985) find what they call the reversal effect. Namely they found evidence that over the long term 36-60 months in the US stock market that stocks which were previously winners become losers and stocks which were previously losers become winners.

There are several possible explanations for the momentum phenomenon. Jegadeesh and Titman (1993) suggest that there exists an underreaction in stock prices following earnings announcements. They suggest that the reaction in prices is too slow to incorporate the news of past earnings announcements. They also offer the overreaction explanation which states that over longer time periods, agents extrapolate good past performance into the future and thus again prices do not reflect the full market information in a timely manner. The overreaction and

underreaction hypothesis stem from the behavioural school of thought, which is the main alternative to the traditional risk-based approach based on the Capital Asset Pricing Model.

Fama and French (1993) offer an explanation based on risk. They argue that the abnormal returns generated by momentum strategies are due to some risk factor and propose a three factor model which uses systematic risk, book to market ratio and size to explain momentum, however they conclude that the three factor model is not able to capture the abnormal returns caused by momentum investing.

An interesting finding by Griffin, Ji and Martin (2003) was that momentum strategies widely differ in profitability across developed and emerging markets. Namely it was found that emerging markets exhibit much smaller momentum profits than their developed counterparts. An interesting explanation for this is explored in the paper Joseph D. Vu (2012), the market liberalization hypothesis. The author postulates that the lower momentum profits generated by emerging markets are due to market isolation, and that market liberalization reforms recently introduced in these countries tend to increase the gains from momentum strategies.

Hypothesis development

Most of the literature related to momentum is concentrated on studying this phenomenon in developed markets such as the United States, United Kingdom, Japan etc. While there exist papers, which study this phenomenon in developing markets, such as Griffin, Ji and Martin (2003), there still exists a large discrepancy in analysis between developed and developing markets and also in the results found. For instance, Rouwenhorst (1999) finds that momentum strategies indeed generate abnormal returns in developing markets. Similarly, Griffin, Ji and Martin (2003) also find that momentum strategies are profitable in some developing markets. Contrastingly, Ornelas and Fernandes (2005) who examine 15 emerging markets find no evidence of momentum strategies being profitable.

An important characteristic of African markets is that they are all still in development. From the economics point of view, it would be sensible to expect that the overall country performance affects the profitability of momentum strategies since the state of the economy directly dictates exposure to macroeconomic risk factors. Lakonishok Schleifer and Vishny (1994) test if the profitability of momentum strategies differs in periods of good and bad performance in the

United States market and reject this risk-based explanation in favour of their behavioural theory which states that the different states of the economy lead to different marginal utilities of investors. Further, Griffin Ji and Martin (2003) test if the economic state proxied by positive or negative GDP growth has explanatory power for momentum, along with the aggregate market movements and find no significant relationship. On the other hand, the study by Chordia and Shivakumar (2002) provides evidence for the risk story as they state that momentum is related to business cycles.

The motivation for this thesis stems from the contrasting results and the low representation of African markets in finance literature. While the reasons for these differences in profitability between developed and developing markets remain a puzzle, a small step towards solving it is to examine how momentum strategies perform in developing markets. Further, finance theory still lacks an economic explanation for the momentum phenomenon. One possible explanation explored in Griffin, Ji and Martin (2003) is that exposure to macroeconomic risk drives momentum profits. They argue that "If a strategy is risky, then there should be at least some states of the world (those where investors have high marginal utility) in which the strategy underperforms." This in fact means that different economic states should yield different momentum profits as the exposure to macroeconomic risk changes according to the state of the economy. Namely, in bad economic states it is reasonable to expect lower momentum returns and conversely in states of stronger economic growth we should larger momentum returns. Such a relation would confirm that macroeconomic risk is a driver of momentum.

The aim of this thesis is to examine the effectiveness of momentum investing strategies in the markets of South Africa, Mauritius and Egypt in order to provide investors with a clear insight on whether long term momentum strategies are worth employing in African markets. The thesis will also examine the market of the Netherlands, which will be used as a benchmark in order to compare the results between developed and developing markets. The Netherlands is chosen as a benchmark as it can be considered a fairly stable market which is known to exhibit the momentum anomaly, while also having a similar number of listed stocks to Egypt and Mauritius. Further, this thesis will examine whether the profitability of momentum strategies differs between four states of economic growth in order to also add scientific relevance as this relationship has not been re-examined using more recent data. The economy of the Netherlands

exhibits both positive and negative growth periods over the chosen sample time period from 2009-2020 which makes it a good benchmark to compare the results between the developed and developing markets. The main research question of this thesis is as follows: *Do long term price momentum and contrarian investment strategies generate abnormal returns in the stock exchanges of South Africa, Mauritius, Egypt and the Netherlands and can they be explained by exposure to macroeconomic risk arising from different economic states?*

In order to answer this question, four hypotheses are formed:

Hypothesis 1: Momentum strategies do generate abnormal returns in the markets of South Africa, Egypt, Mauritius and the Netherlands in the period from 2009 until 2019.

Hypothesis 2: There is a reversal effect present in the data in the markets of South Africa, Egypt, Mauritius and the Netherlands in the period from 2009 until 2019.

Hypothesis 3: The reversal effect will be stronger in the Netherlands market than in the markets of South Africa, Egypt and Mauritius.

Hypothesis 4: Macroeconomic risk caused by different economic states cannot explain momentum in the African markets and the Netherlands in the period from 2009-2019.

This thesis uses the methodology of De Bondt and Thaler (1985) to examine earnings momentum strategies in the above-mentioned markets. Using data gathered from the Erasmus Data Service Centre and the Thompson Reuters database, this study finds winner minus loser portfolio returns of on average 12% in one market and significant reversals in 3.

The rest of the thesis is structured as follows: the next section will give an outline of the existing literature on momentum strategies. Subsequently the data and methodology used in this thesis will be discussed in section 3. In section 4 the empirical results will be stated and compared to previous findings. Finally, a short discussion about the implications of these findings will be presented, followed by some concluding remarks.

Literature review

This section offers a thorough overview of momentum investing theory starting from the CAPM model until most recent additions.

Sharpe (1964) and Lintner (1965) create the Capital Asset Pricing Model (CAPM) which postulates that the expected returns from stocks are proportional to the degree of risk associated to holding these stocks. They break down the risk of holding a specific stock into two components, namely the systematic and unsystematic risk component. The systematic risk component represents the risk that cannot be diversified away by adding more stocks to the portfolio, while the unsystematic risk component represents the risk inherent to a specific stock, which can be diversified. They go on to say that it is only the exposure to systematic risk which determines the expected return. Therefore, the existence of abnormal returns generated by momentum strategies represents a violation of the CAPM model.

There are different types of momentum strategies. First, we will discuss the most common strategy, the price momentum strategy. This strategy focuses on using past stock returns in order to rank stocks as winners or losers according to their past performance. The idea is to then buy the winners and short sell the losers with the expectation that the winners will keep on winning while the losers continue performing poorly. De Bondt and Thaler (1985) use past returns to find that in the period of 36 to 60 months after the portfolio formation period, the loser stocks tend to outperform the winners by 25% in the US stock market, which is quite striking.

Price momentum in the short term of 3-12 months was documented by Jegadeesh and titman (1993) in the US stock market. They found that the strategy of buying past winners and short selling past losers yields a return of about 1% per month following 3-12 months after the portfolio formation period. Further, their results over the long term, 36-60 months after portfolio formation period, are consistent with the findings of De Bondt and Thaler (1985) where they also document a reversal.

Moskowitz and Grinblatt (1999) find that a momentum strategy based on industries is profitable. They find that buying stocks from industries which had good past performance and short selling stocks from poorly performing industries indeed creates abnormal returns even after controlling for size and book to market equity.

A different approach was taken by Chan, Jegadeesh, and Lakonishok (1996) where instead of focusing on past returns performance, a profitable momentum strategy can be comprised by sorting stocks according to their past earnings. This strategy can be referred to as the earnings

momentum strategy. They argue that firms with high earnings growth tend to continue performing well into the future. They again attribute this to the delay in price reaction to earnings announcements.

Rouwenhorst (1998) examines momentum strategies in 12 European countries and finds that abnormal returns can be earned in all of them, with maximum earnings up to 1.35% per month.

Griffin Ji and Martin (2003) make an extensive study covering 40 countries around the world. They find significant momentum profits across the globe and report that momentum profits are higher in more developed markets. They try to explain momentum using macroeconomic variables, however they proved to be insignificant.

Another approach to classifying stocks is according to value. According to their respective price to earnings ratio (P/E), stocks can be classified as either growth stocks or value stocks. Growth stocks are characterized by a high P/E ratio, which is suggests that these companies expect to grow in the future and reinvest their profits instead on paying out higher dividends. On the other hand, value stocks are stocks with a low P/E ratio, and they represent well established companies. Ball (1978) finds that value stocks perform better than growth stocks. This is also in line with the findings of Lakonishok, Shleifer, and Vishny (1994) who also found that value stocks outperform growth stocks.

The relationship of momentum with firm size has been explored by Hong, Lim and Stein (2000) who have shown that larger firms experienced smaller momentum profits than small firms. These findings are in line with the findings of Jagdeesh and Titman (1993) who also noted that larger companies exhibited lower momentum profits in comparison to smaller companies.

Fama and French (1996) used their three factor model to try and explain momentum and found that it is able to explain the reversal effect found by De Bondt and Thaler (1985), however they admit that the three factor model fails to capture the short term momentum found by Jagdeesh and Titman (1993).

In summary, various explanations for momentum are explored by these papers, however the exact reason is still a matter of debate. Further, these papers show that momentum is related to other anomalies such as the value and earnings anomaly, which makes it more difficult to give an

exact explanation. Momentum has been documented in markets around the world, where it exhibits different degrees of profitability. The general consensus is that risk can explain it partially, along with accounting factors and other behavioural explanations. The most prominent explanation seems to come from the behavioural school, with the most prevalent hypotheses being the underreaction and reversal, however Fama and French (1996) criticize behavioural explanations on grounds that their models may explain a single anomaly, but fail to offer a model which could capture all violations of the CAPM model.

Data

This section describes the dataset, which was used in the study, mentions the sources where the data was collected from and describes how the data was manipulated in order to suit the study. The dataset used for this thesis contains monthly stock prices of 128 most traded companies from the Johannesburg Stock exchange (JSE), 32 most traded companies from the stock market of Mauritius (SEMDEX), 30 most traded companies from the Egyptian market (EGX) and 25 most traded companies from the Amsterdam stock exchange (AEX) for the period from December 2009 until December 2019 obtained from the Erasmus Data Service Centre which uses the Thompson Reuters database. These data will be used in order to test the first three hypotheses concerning momentum and reversals. This thesis uses the indices as a proxy for the whole market as in the case of the African markets, a large number of companies were only listed after 2008 or have missing data in several periods, thus the index is used as a representative benchmark for the whole market. The dataset also contains yearly real gross domestic product (RGDP) growth figures for all four countries in the period from 2009 until 2019 obtained from the World Bank, which is used to test the fourth hypothesis concerning the relationship between momentum and economic states. This time period was selected in the study for two reasons. The first is that using more recent data makes the results found to be more relevant for investors, while the second reason is to avoid the structural break which occurred due to the 2008 financial crisis. It is important to note that not all companies have data for the whole period, so the months for which there are no values are not used. If a certain company had less than three years' worth of data, it was excluded from the study. The GDP figures contain no missing values.

First the monthly returns were computed for each company in all markets using the following formula (1):

$$R_t = \frac{P_{t+1} - P_t}{P_t} \qquad (1)$$

Where R_t is the monthly return and represents the relative change in closing price of the stock between the first trading day of the month denoted by P and the first trading day of the following month P_{t+1}. After the returns for each company were computed, abnormal returns *(AR)* for each company at time *t* were computed simply by subtracting the monthly return of their respective market (R_m) at time *t* from the monthly return of each company (R_t) at time *t* using formula (2):

$$AR = R_t - R_m \qquad (2)$$

Table 1 gives an overview of the four markets in the study. Note that prices of shares are expressed in local currency (South African Rand, Mauritian Rupee, Egyptian Pound, Euro) while the market capitalization is expressed in US Dollars.

Methodology

This section will describe in detail how the study was conducted, followed by a description of the testing procedure and evaluation criteria for rejecting each hypothesis.

Momentum Portfolio Formation

This thesis closely follows the methods used by De Bondt and Thaler (1985) to compute the long-term price momentum. Our momentum strategy stats with a ranking period denoted by J of lengths of 12, 24, 36 and 60 months during which stocks are ranked based on their past performance. Past performance of each company is evaluated based on the cumulative abnormal return (CAR) that company has generated during the ranking period using the following formula (3):

$$CAR = \sum_{j=0}^{N} AR / N \qquad (3)$$

Where *N* is the total number of months in the ranking period. Subsequently, stocks are selected into winners and losers' portfolios by sorting all available stocks in a market in descending order based on their CAR values of the ranking period. For the South African market which has 127 companies, the stocks were divided into quartiles with the top 25% performing stocks being in the first quartile are chosen for the portfolio denoted as winners and the bottom 25% performing stocks were chosen for the portfolio denoted as losers. The markets of Egypt, Mauritius and the

Netherlands all contained around 30 companies, so the stocks had to be divided into terciles in order to have enough stocks in the portfolios to make idiosyncratic risk negligible, Ornelas and Fernandes (2005). The winner and loser portfolios are equally weighted, meaning that they contain an equal amount of stocks.

Table 1. Overview of the markets included in study, the mean share price is expressed in terms of local currency (South African rand, Mauritian Rupee, Egyptian Pound, Euro) and the Market capitalization is expressed in billion US dollars.

Market	Number of listed companies	Mean share price	Market Capitalization	Turnover ratio
South Africa (JSE)	274	7577.08	865.33	33.13
Mauritius (SEMDEX)	95	176.61	9.85	4
Egypt (EGX)	246	1171.41	42.01	25.26
The Netherlands (AMX)	103	2357.24	1100.11	40.84

After making delay of one month after the ranking period in order to account for microstructure issues starts the investment period denoted as J, also with lengths of 12, 24, 36 and 60 months during which the winner stocks from the corresponding ranking period are bought and held and the losers are short sold. Using again the formula for cumulative abnormal returns The performance of the winner and loser portfolio is evaluated based on the cumulative abnormal returns of generated over the investment period.

Momentum Portfolio comparison

For every ranking period J, the winner portfolio is bought and held, and the loser portfolio is short sold, creating zero cost winner minus loser portfolio (WML) and this position is held until the end of each investment period I. This leads to a total of 16 strategies which were assessed per market over the 10 years of data yielding a total of 64 strategies in the study. If the winner portfolio outperforms the loser portfolio in the investment period yielding a positive WML value, then this is taken as evidence of momentum since the winners keep on winning and the losers keep losing. Conversely, if it happens that the WML value is negative, this means that the loser portfolio has outperformed the winner portfolio in which case we conclude that a reversal has happened. It should be noted that some strategies can be implemented more times than others in the sample time period. Namely, every strategy has a duration of *I+J+1* months, thus for instance a 12 month ranking followed by a 12 month investment period strategy can be executed five times throughout the sample period while a strategy consisting of a 64 month ranking and investment period can be executed only once during the 10 years of data which are used.

Momentum and Economic States

In order to assess the effect of macroeconomic risk on momentum, a sample split is performed using the seasonally adjusted quarterly GDP growth figures obtained from the World Bank, for each market we thus have 40 quarters of RGDP growth, since 10 years of returns are used in the study. These 40 quarters are sorted in ascending order and ranked in 4 sets, with the top set containing the 10 best seasonally adjusted GDP growth quarters, the two middle sets each containing 10 seasonally adjusted GDP growth quarters and the bottom set containing the 10 worst quarters. Subsequently, in each market the stocks are again classified into winners and losers based on their cumulative abnormal return's performance across all quarters (since the return data set is in months, one quarter is the sum of four months). The proportions from the previous section were kept in order to maintain equal weight portfolios, thus again the stocks of the JSE were split in quartiles while the other markets were split into terciles such that the top split contains the winner portfolio and the bottom split contains the loser portfolio. Then the momentum strategy is executed in the same fashion as previously, by going long in the winners and shorting the losers and thus creating the WML portfolios. In this case, the ranking and investment period consisted of 15 months each since every set is 2.5 years' worth of data. It is

important to note that in this case a one-month break between the ranking and investment period was not adhered to.

Testing the hypotheses

The first two hypotheses are tested using an independent one sample t-test for all 16 strategies of each market to see if the winner minus loser portfolio yields returns which are significantly different from zero. The test is conducted at the 95% confidence interval. The strategy which has highest abnormal returns out of the 16 and is significant at the indicated confidence level is considered to be optimal, thus in order to confirm hypothesis 1 a market has to have at least one positive and significant WML value. Similarly, in order to confirm hypothesis 2 a market has to have at least one negative and significant WML value. In order to test the third hypothesis, in case a reversal occurs in at least one African market and the market of the Netherlands, and these results prove to be significant under the first hypothesis, then simply the size of the WML portfolios will be compared to see if the reversal is more pronounced in the Netherlands market. If these criteria are not met, namely that a reversal is documented in both the African markets and the Netherlands and both found to be significant, then the result of the second hypothesis will be stated as inconclusive. The fourth hypothesis is also verified using a one sample t-test where for each market it will be tested if the WML portfolio is significantly different from zero at the 95% confidence level. In this case the however, in order to confirm hypothesis 4, only a significantly negative value for the lowest state would confirm the risk hypothesis, since based on literature it is to be expected that the returns be mostly positive across all states.

Results

In this section the findings of the study will be stated and their implications for the hypotheses will be discussed. The tables numbered two, three and four and five contain the results from momentum strategies per each market in the study. Table six contains the results of momentum strategies ranked by GDP growth performance.

The table 2 below shows test results for all 16 combinations of ranking period J and investment period I in the market of South Africa are presented along with the difference between the winner and loser portfolio and their respective t-statistics. It can be seen that in most cases the returns of the strategy which consists of buying winners and short selling losers leads to positive returns in all but one case, namely the combination of a 36 month ranking and 36 month

investment period, which yields a negative return of around -12% per year, but is insignificant at the 95% confidence level.

All other combinations of ranking and investment periods yield to positive returns. Remarkably, 5 strategies show significant positive returns at the 99% confidence level. Four of these strategies have positive returns ranging from 11%-17.5% a year, while the strategy of 36 month ranking and 60 month investing period yields to a striking result of 38.65% return per year. From this we can see that contrarian strategies would be highly unprofitable in the market of South Africa. The only reversal which was observed was found to be insignificant at the desired confidence level. Therefore, we conclude that the market of South Africa has a pronounced underreaction to information since the winners keep on winning and losers keep on losing in all but one case. An interesting remark is that in all but one strategy, namely (60,12), the returns of the loser portfolio experience stronger fluctuations than that of the winner portfolios, going up or down by more

than 10%. The average WML portfolio return is 10%, while the average winner portfolio is 20.1% and the average loser portfolio is -6%

In the market of Mauritius, we can see that again most strategies yield positive WML returns. Four of these strategies yield returns which are significant at the desired confidence interval, with the highest being just above 19% per year with the strategy of a 36-month ranking followed by a 36-month investment period. The highest cumulative abnormal return is recorded in the 60-month ranking, 60-month investment strategy, however this result is not significant at the 95% confidence level. Interestingly, there is only one reversal which occurs in the 60-month ranking and 36 month investing strategy which yields a return of around 27% percent a year and is significant even at the 99% confidence level. This is a sign that overreaction is present in the market of Mauritius, however it seems that again the underreaction effect is dominant since there is only one reversal. The size of the WML portfolio seems to fluctuate randomly regardless of the ranking and investment period. The average WML portfolio had a positive return of 12%, while the average winner portfolio has a return of 4.2% and the average loser portfolio has a return of -4.5%.

Table 2. Results of WML portfolio performance in South Africa for all investment periods J and investment periods I range from 12 to 60 months, along their respective test statistics

Long term price momentum South Africa	Winner minus loser portfolio returns and test statistics	I=12	I=24	I=36	I=60
J=12	W	-.0998405	.368752	.0318935	.2493577
	L	-.178277	.2265129	-.2076108	.130777
	WML	.0784366	.1422391	.1757173	.1185807
	t-value	(0.9618)	(2.2516) ***	(4.1037) ***	(2.2637) ***
J=24	W	.1611914	.2844063	.3411993	.3298727
	L	-.1536734	.2177999	-1793581	-.2291876
	WML	.007518	.0666064	.1618412	.100685
	t-value	(0.1023)	(0.6968)	(1.5579)	(1.1276)
J=36	W	.2617455	.3392158	-.009911	0099328
	L	.2551191	.1836559	.1128703	-.3766011
	WML	.0066265	.1555599	-.1227813	.3865339
	t-value	(0.0704.)	(2.1778) ***	(-1.1679)	(4.4998) ***
J=60	W	.1397048	-.1089306	.3219014	.3074612
	L	-.0502727	-.2573481	-.2147758	-.2701168
	WML	.0894321	.1484174	.1071256	.0373444
	t-value	(0.9825)	(1.4684)	(1.3794)	(0.3775)

Table 3 below shows test results for all 16 combinations of ranking period J and investment period I in the market of Mauritius are presented along with the difference between the winner and loser portfolio and their respective t-statistics.

Table 3. Results of WML portfolio performance in Mauritius for all investment periods J and investment periods I range from 12 to 60 months, along their respective test statistics

Long term price momentum Mauritius	Winner minus loser portfolio returns and test statistics	I=12	I=24	I=36	I=60
J=12	W	.0461599	.0418144	.0028522	.0852612
	L	-.0487685	.0276832	.0026334	.0225017
	WML	.0949285	.0141312	.0002188	.0627595
	t-value	(0.8678)	(0.1242)	(0.0031)	(0.9845)
J=24	W	.1287181	.0107694	0651115	-.010805
	L	.0487155	-.0288031	.0534663	-.1395845
	WML	.0800026	.0395725	0116452	.1287794
	t-value	(0.7503)	(0.2920)	(0.1354)	(1.3559)
J=36	W	.1694077	.1069669	.172279	.0288048
	L	.021505	-.048065	-.019092	-0605395
	WML	.1479027	.1550319	.191371	.0317347
	t-value	(1.0467)	(1.7883) *	(2.1642) ***	(0.3508)
J=60	W	.0926175	.0478525	-.0639158	.909502
	L	-.057672	-.0378856	.2089321	.0332035
	WML	.1502896	.0857381	-.272848	.876298
	t-value	(2.0776) ***	(0.8012)	(-2.4118) ***	(1.0182)

The table 4 below shows test results for all 16 combinations of ranking period J and investment period I in the market of Egypt are presented along with the difference between the winner and loser portfolio and their respective t-statistics.

In the Egyptian market, it can be seen that a reversal had occurred 4 times. Namely, the strategies consisting (24,36), (36,36), (60,36) and (60,60) ranking and investment periods show a reversal, while the reversal in strategy consisting of a 60 month ranking and 36 month investing period is significant and shows that the loser portfolio outperformed the winners by almost 17%.

Table 4. Results of WML portfolio performance in Egypt for all investment periods J and investment periods I range from 12 to 60 months, along their respective test statistics

Long term price momentum Egypt	Winner minus loser portfolio returns and test statistics	I=12	I=24	I=36	I=60
J=12	W	-.0476733	-.01057	.0542288	-.0801832
	L	-.0482213	.3182261	- .0599568	-.0939296
	WML	.000548	.328796	.1141856	.0137464
	t-value	(0.0020)	(1.1368)	(1.3933)	(0.1414)
J=24	W	.0476733	.343942	-.0108187	.1803147
	L	-.1096309	.2084701	.1393951	-.1009505
	WML	.1573042	.1354718	-.1502137	.0793642
	t-value	(0.6209)	(0.7358)	(-0.8283)	(0.5757)
J=36	W	-.0116358	.1290763	-.1094087	.1096309
	L	-.1254148	.0210584	1.815946	.0599568
	WML	.1137789	.1080179	-1.925354	.0496741
	t-value	(0.5242)	(0.5541)	(-0.9215)	(0.4266)
J=60	W	.0486502	.0045963	-.2835576	-.228767
	L	-.1925074	-.251099	-.115082	-.1102381
	WML	.2411576	.2556953	-.1684756	-.1185289
	t-value	(1.3007)	(1.2811)	(-1.7240) *	(-1.2710)

Interestingly this is the only significant result observed on the Egyptian market in the study period of 2009-2019. It seems that momentum or contrarian strategies are not effective in Egypt in the studied time period since none of the other results are even close to being significant at the desired confidence level. Another peculiarity which arises is that in all 3 African markets studied in this thesis, the 36-month ranking and 36 month investing strategy shows a reversal. Further, the loser portfolios for the 60-month ranking period are all negative with the biggest decrease being 25%. As in the case of Mauritius, on the Egyptian market we also see little dependence of the size of the WML portfolio on the length of the ranking and investment period. They seem to fluctuate randomly without any pattern. The average WML portfolio yields a return of -5%.

Interestingly, the average winner portfolio yields a return of -6.34%, and the average loser portfolio yields a positive return of 0.004%.

The table 5 below shows test results for all 16 combinations of ranking period J and investment period I in the market of the Netherlands are presented along with the difference between the winner and loser portfolio and their respective t-statistics

In the Netherlands market it can be seen that in total 7 strategies yield significant results. Five strategies show significant positive returns with the winners outperforming the losers, which implies that there is underreaction present. However, the Netherlands also has the most reversals in the study, two in total which come from the strategies of ranking and investing of two and five years which yields a return of 21% per year and five and three years which yields a return of 34% per year. Therefore, contrarian strategies indeed can be profitable in the Netherlands. It can also be seen that the cumulative abnormal returns of the winner portfolios increase as the ranking period is J is extended. Conversely, this is not the case for the loser portfolios, who seem to fluctuate between 1% and 20% regardless of the ranking and investment periods. Remarkably, opposed to randomly fluctuating as in the cases of the African markets, the size of the WML portfolio seems to increase as the lengths of the ranking and investment periods are increased. The average WML portfolio yields a return of 6%, exactly the same as the average winner portfolio, while the average loser portfolio also yields a positive result of 0.001%.

From table 6 it can be seen that out of 16 momentum strategies, 14 yield positive returns and only 2 yield negative returns, both of which occurred in the EGX. A notable difference is observed between the African markets and the Netherlands as all of the African markets combined have the same amount of significant results as the AMX. This is further emphasized by the scale of the returns as it is also the AMX which is home to the most profitable strategy, which yields an impressive 55% return in the highest GDP growth state. The EGX is the only market which displayed a significant reversal in the lowest growth state. Finance theory regarding the relationship between momentum and macroeconomic risk suggests that reversals should be more prevalent in down markets, due to the larger exposure to risk. The overall results with the exception of the EGX are at odds with the risk-based expectations since the returns are overwhelmingly positive almost throughout.

Table 5. Results of WML portfolio performance in the Netherlands for all investment periods J and investment periods I range from 12 to 60 months, along their respective test statistics

Long term price momentum Netherlands	*Winner minus loser portfolio returns and test statistics*	*I=12*	*I=24*	*I=36*	*I=60*
J=12	*W* *L* *WML* *t-value*	*.034209* *-.0007772* *.0349862* *(0.3265)*	*.058048* *.0091057* *.0489423* *(0.9894)*	*080236* *.0638899* *.0163461* *(0.1815)*	*.1152537* *-.1027967* *.2180504* *(1.6643) **
J=24	*W* *L* *WML* *t-value*	*.034209* *-.0143207* *.0485297* *(.03168)*	*.080236* *.0230271* *.0572089* *(2.1591) ****	*.0824594* *.0833201* *.0008607* *(0.0154)*	*-.1536386* *.0578312* *-.2114698* *(-2.3187)****
J=36	*W* *L* *WML* *t-value*	*.0006612* *-.0727626* *.0734238* *(0.8256)*	*.0541654* *.0487664* *.005399* *(.00850)*	*.0739246* *-.1312425* *.2051671* *(3.1588) ****	*.0743493* *-.0053889* *.0797382* *(1.5076)*
J=60	*W* *L* *WML* *t-value*	*.1183946* *-.1188516* *.2372462* *(2.7811) ****	*.2323906* *-.0225112* *.2549018* *(1.3037)*	*-.1188516* *.2233557* *-.3422073* *(-2.5026)****	*.2233557* *-.0197464* *.2431021* *(1.6982) **

Interestingly enough the EGX is the only market with a significant reversal. However, in line with expectations is the trend of increasing returns in better states which is the case here. Further, this is evidenced by the fact that the only positive return for Egypt occurs in the best state. Also, in line with finance theory is the fact that the

results show much stronger momentum earnings for the only developed country than for the others, however it should be noted that South Africa has two significant returns and the other two are very close. This might be a good sign for the country in terms that it is catching up in terms

of development, but also as importantly it does seem to go in hand with the market liberalization hypothesis suggested by Joseph D. Vu (2012) which states that developing countries which pursue more open market policy do seem to be catching up to the developed as South Africa is considered to be the most liberalized in the trio of this study. Further, Mauritius which is closely integrated with South Africa also has exclusively positive returns unlike Egypt which is known to be a more conservative and planned economy.

Implications for the hypotheses

This thesis first hypothesized that there exist reversals in the markets of South Africa, Mauritius, Egypt and the Netherlands. In the case of South Africa in the studied time period from December 2008 until December 2020 only one reversal was documented and found to be statistically insignificant at the 95% confidence interval. All 15 other strategies yielded positive returns conclusion is that the underreaction effect seems to be dominant in this market, rather than the overreaction effect. Regarding hypothesis 4, the JSE does show two very strong and very significant positive values of the WML portfolio of around 38% and 48% between the two best states respectively, while the positive WML returns in the two worst states are very close to being significant at the 95% confidence interval. Therefore, we can conclude that there is not enough evidence to reject hypothesis 4 and we can say that macroeconomic risk arising from the different states of GDP growth do not explain momentum in this market.

Regarding the market of Mauritius, we see a similar trend of overwhelmingly positive returns of WML portfolios, with three of them being significant. However, the strategy of a 36-month ranking followed by an investment period of the same length showed a reversal in which the loser portfolio outperformed the winner portfolio by 27%. This result was found to be significant even at the 99% confidence level. Therefore, we can conclude that there was not enough evidence to reject the first hypothesis of abnormal returns generated by momentum investing existing on the market of Mauritius in the time period from December 2008 until December 2020. Further, there is not enough evidence to reject the second hypothesis of reversals being present in this market. Regarding hypothesis 4, no significant values for the WML were found at all when taking into account the economic states which leads us to conclude that there is not enough evidence to reject hypothesis 4 and we can therefore say that exposure to macroeconomic risk does not explain momentum profits.

Table 6. Results of the WML portfolio performance across 4 different states of annualized quarterly GDP growth for all four markets. The length of the ranking and investment period are both 15 months.

	GDP Growth States							
	Lowest		*2*		*3*		*Highest*	
Market	*WML*	*t-statistic*	*WML*	*t-statistic*	*WML*	*t-statistic*	*WML*	*t-statistic*
South Africa	*0.1131*	*(1.5671)*	*0,1401*	*(1.5991)*	*0.3786*	*(1.7942) **	*0.4752*	*(2.1234) ****
Mauritius	*-0.0651*	*(-0.8392)*	*0.0702*	*(0.6644)*	*0.1126*	*(1.3627)*	*0.0909*	*(0.5333)*
Egypt	*-0.1222*	*(-1.6516) **	*-0.1932*	*(-1.5469)*	*0.1439*	*(1,1559)*	*0.2621*	*(1.6451) **
Netherlands	*0.1711*	*(2.7510) ****	*0.2844*	*(2.3691) ****	*0.4448*	*(4.002) ****	*0.5561*	*(3.5056) ****

In the case of Egypt, this is the market where most reversals were observed, with a total of four. Unlike the markets of South Africa, the other large African economy in this study, both positive and negative values of the WML were frequently observed. The reversal which happened in the strategy consisting of a 60-month ranking and 36-month investment period yielded a negative return of 27% and was found to be statistically significant at the 95% confidence level. This

leads to the conclusion that there is not enough evidence to reject the second hypothesis that reversals did occur in Egypt during the studied time period. However, this reversal was in fact the only significant result found in the market which leads to the conclusion that there is enough evidence to reject the first hypothesis of momentum investing being profitable An interesting note is that Egypt is the only market in which the average winner and loser portfolio are of opposite signs and it is also only Egypt which shows significant reversals when taking into account the economic states from table 6. Therefore, we conclude that there is enough evidence to reject hypothesis 4 and therefore say that macroeconomic risk does play a role in explaining momentum profits in this market.

The Amsterdam stock exchange has yielded the highest number of significant results out of all studied exchanges with a total of 7 when analyzing momentum only based on price. It is also the market with the highest number of significant reversals and remarkably has all four results of the WML portfolio in table 6 significant even at the 99% confidence level. Therefore, we can conclude that there is not enough evidence even at the 99% confidence level to reject the first and second hypothesis of there existing positive returns from momentum investing and reversals in the market of the Netherlands. The third hypothesis of this thesis was that the overreaction effect will be stronger in the Netherlands market than in its African counterparts. Looking at all of the reversals which were found to be significant across the markets in the study, the strongest reversal observed was indeed from the AMX with a WML of -34.2% for the strategy (5,3). The second strongest reversal was observed in Mauritius with a WML of -27,2%, and the third is again from the AMX with -21%. We can therefore conclude that there is not enough evidence to reject the second hypothesis that the reversal effect is more pronounced in the Dutch market than in its African counterparts. This is further evidenced by the results of table 6, where the AMX had the strongest and most significant results. This allows us to almost with certainty reject hypothesis 4 of the macroeconomic risk explanation being relevant in this market.

Discussion

This section will first compare the findings of this study with existing literature, followed by some implications for investors and an outline of the limitations of the study.

Comparison with existing literature

The results of this study found a predominantly stronger performance of winner portfolios across all countries in the study. The striking example was South Africa, where not a single reversal was documented, while 5 strategies had significant positive WML returns. These results are very much in line with Griffin, Ji and Martin (2003) who considered 11 countries and in only 3 the Losers outperform Winners, with only one being significantly different from zero. All other 8 countries showed positive WML returns, with two countries showing positive and significant WML profits (South Africa and Chile). Further, the results are also in line with what was found by Rouwenhorst (1999) where on average past Winners outperform Losers in 17 of the 20 countries analyzed, and the average WML return is more than two standard errors away from zero. The results of the JSE from table 6 may be rather interesting to consider in future studies in relation with the market liberalization hypothesis, since these are clear signs that this market is catching up to even the most developed counterparts. Perhaps more light would be shed on this matter by future studies where effects of macroeconomic risk factors would be compared to the between older and more recent data to see if they have dropped in significance over time, which would make a good case for this idea. The results for Mauritius also seem to be in line with previous literature, namely the findings of Bundoo (2011) who's analysis was focused only on that market. Although he was testing for momentum in the short term, he found that a strategy of a six month ranking followed by a 12 month investment period yielded returns of 0.86% per month, which seems comparable to the 9.5% per year found in this study for the strategy of a 12 month ranking period followed by a same length investment period, although not statistically significant. Further, Naranjo and Porter (2007) who studied momentum in emerging markets found significant positive results in all of them. On the other hand, Fernandes and Ornelas (2005) who use a dataset from 1995-2005 find significant reversals in 12 of the 15 emerging market countries in their study, including South Africa where they note a negative WML yield of 1.75% for a (24,24) strategy. However, the authors of that study also included other factors such as systematic risk and size, which may have made different the stocks that were selected for each winner and loser portfolio. Perhaps the most interesting findings of this lie within the EGX which was the only market in which momentum could be explained by risk factors. However, it should be noted that these results may have been caused due to not having included a month in between the ranking and investment period, as Griffin, Ji and Martin (2003) also attribute the

findings of the paper by Chordia and Shivakumar (2002) who also had the same oversight in their study. Finally, a comparison is made with the findings of De Bondt and Thaler (1985) who in their study of the US market found that longer ranking periods were followed by reversals of stronger magnitude. In this study, it seems that the length of both holding and investment periods is not related to the magnitude of the WML portfolio performance in the African markets. Although it should be mentioned that this study does find in the Netherlands market which is most comparable to that of the US that the reversals occur in strategies with a duration of 7 and 8 years. Regarding macroeconomic risk, the findings of this thesis are partly in line with the previous literature which also documented overwhelmingly positive WML returns regardless of economic state. Griffin, Ji and Martin (2003) find significant positive WML returns for European countries in all four economic states, which is also confirmed in this thesis for the case of the Netherlands. On the other hand, for emerging markets Griffin et al find negative WML returns in all four economic states. However, it is hard to make a direct comparison in this instance because Griffin et al did not segment the African markets from the rest of the developing markets in their study of economic states. While the general macroeconomic factors may not be useful in explaining momentum, the case of Egypt in this thesis may suggest that there are in fact in play country specific risk factors which cannot be captured by traditional macroeconomic variables such as GDP growth. These may be some unobserved political factors, however without much speculation it should be stated that this market deserves much more attention by researchers, especially given the size and importance of Egypt as a country.

Implications for investors

The results of this study find overwhelmingly positive returns for momentum strategies in all markets that were analyzed. The markets of South Africa and Mauritius seem to be predominantly positive with overall strong WML returns, which according to behavioural finance theory is a sign of underreaction to news information. On the other hand, it may well be that the companies which are performing well on the market indeed do back up their valuations with actual success in their industry. It would be interesting to see in future research if there is a correlation between the winners returns and their industry performance for these markets. However, it is an educated guess of this author that the winner companies belong to the banking industry of Mauritius and to the energy industry in South Africa. For investors this could provide enough evidence to not employ contrarian strategies on these markets. It would be interesting to

see if the movements of these markets are somehow cointegrated given their geographic proximity and the level of trade between these countries. In the case of Egypt, it would be fair to say that the overall result of momentum strategies can be stated as inconclusive. Although a significant reversal was found in both cases which were analyzed, this was also the only significant finding for the market. On this market both reversals and positive returns were frequent, with the latter being the majority in the analysis exclusive of the state of the economy. It should be mentioned that the index used only contains 30 stocks, out of which 6 had to be dropped for some strategies due to lack of data. Further, existing literature is very scarce when it comes to this market, which is strange considering the size of the economy and its influence. Therefore, it is hard to compare the results of this study with other findings due to the lack of thereof. Maybe the results in the short term following the methodology of Jagdeesh and Titman (1993) could prove to be significant in some future study. Regarding the Netherlands, this study only builds up on the existing bulk of literature which confirms the presence of both momentum profits and reversals. However, regarding momentum theory, it should be put into question if developing markets are catching up to the developed in terms of the magnitude of momentum profits. While it may still be the case that reversals are still stronger for developed markets, the findings of this study at least give signs that large gains can be made in African markets by employing a momentum strategy. Returns in excess of 10% were frequently observed in all 3 African markets. Regarding the findings of table 6, it would be fair to advise investors against taking measures to hedge themselves against macroeconomic risk when employing momentum or contrarian strategies, as it does not seem to explain the results all too well. However, in the case of the EGX, this may be a warning sign that there do exist some unobserved macroeconomic factors which are not captured by GDP which may as well be significant in explaining the large number of reversals in both the first and second analyses.

Limitations

This study tried to assess whether momentum strategies are profitable in the markets in question. While the methodology used was relevant and the dataset thorough, there are still ways in which this can be improved. A more thorough analysis could also include short term momentum strategies, including some other sorting criteria for the winner and loser portfolios such as the P/E ratio and EPS growth. This study also does not analyze factor models which could also have explanatory value in these settings. Other types of momentum such as earnings momentum and

value investing if analyzed would have allowed for more investor takeaway from this study. Further it should be mentioned that some data for Mauritius may be imprecise, as this was stated in literature regarding the data published by the SEMDEX. For completeness purposes, this study could have included Nigeria and therefore have covered all highly relevant African stock exchanges, but due to limited resources this was not feasible. Finally, using a longer time span and maybe weekly instead of monthly returns would have made the statistical significance higher and would make the tests more robust.

Conclusion

This study investigated the effectiveness of price momentum investment strategies on the markets of South Africa, Mauritius, Egypt and the Netherlands and their relation to macroeconomic risk exposure caused by different economic states in the period from December 2009 until December 2019. It was found that all markets except Egypt exhibit significant positive returns from momentum strategies. Further, all markets with the exception of South Africa exhibited significant positive reversals. This study uses methods from well-established and well cited papers such as De Bondt and Thaler (1985) and Griffin, Ji and Martin (2003). The data chosen are in a relevant time period and can be taken as an overview of how the situation regarding momentum investing looks like in Africa currently. The research question of this thesis was: *Do long term price momentum and contrarian investment strategies generate abnormal returns in the stock exchanges of South Africa, Mauritius, Egypt and the Netherlands and can they be explained by exposure to macroeconomic risk arising from different economic states?*

This question can now be answered. The first part of this question concerning the profitability of long-term price momentum strategies can be answered with a definitive yes in the case of South Africa, Mauritius and the Netherlands. Indeed, buying winners and shorting the losers does produce overwhelmingly positive results. In the case of Egypt, although some positive returns have been noted, they did not prove to be significant at the desired confidence level. For the case of contrarian strategies, this thesis finds that employing contrarian strategies does not seem to be the safest choice for investors since reversals have been scarce in this research with the exception of the Egyptian market. However, it cannot be ruled out that these strategies can be profitable, since several all markets except South Africa have documented at least one positive and significant reversal. This does indeed confirm their presence in these markets, however from an

investor point of view, it does not seem to be the best idea to exclusively rely on loser stocks eventually outperforming current winners at some point in the future. When it comes to the question of whether the abnormal returns caused by momentum investing, this thesis concludes that the GDP growth states do not seem to offer much explanatory power. Only in the EGX has a significant negative WML portfolio been recorded, and the author believes that not making a one-month gap between the ranking and investment periods might explain this result in part. Finally, when it comes to the comparison between the performance of momentum and contrarian strategies between these prominent African markets and the well established AMX exchange, it can be stated that the developed markets still have the upper hand when it comes to profitability for both price momentum and contrarian strategies. This thesis has shown that the market of the Netherlands vastly outperformed its African counterparts in both the size and the significance of the returns.

The theoretical conclusion of this thesis gives favour to the behavioural explanations for the momentum anomaly, since the risk factors employed in this study did not prove to be good enough. The market of South Africa shows no signs of investor overreaction, rather it displays an under reactive tendency at the least. While Mauritius and Egypt do have statistically significant reversals, it is hard to attribute this to investor overreaction alone. Conversely, we can say that the Netherlands market does have overreaction by investors. It shows both strong reversals and strong positive returns. When comparing the African markets to the Netherlands, they do show seem to have different characteristics. For instance, the WML portfolios seem to display on average much lower yields on loser portfolios than the AMX. Maybe one part of the explanation for this discrepancy in overreaction between developed and developing markets could be because those markets are more covered by the media and the investors in these markets tend to use more advanced investing techniques which extrapolate on the basis of past returns and may suffer from overestimation. This thesis however does find some evidence in support of the market liberalization hypothesis which states that developing markets which are on the path to becoming more open indeed do seem to have the upper hand in catching up to the developed markets. We have seen that South Africa and Mauritius show much more resemblance to the AMX in the structure of the returns and by the pattern of return behavior when ranked based on GDP growth states. It seems that more closed markets such as Egypt are subject to some form of internal country specific factors which cannot be captured by current prominent risk models. Finally, a

suggestion for future research by the author is to include the Market of Nigeria into consideration, along with repeating the study with other kinds of momentum strategies based on factors other than price, such as value or growth. Also, there seems to be a lack of knowledge and literature concerning the EGX which is quite strange considering the influence and size of this country.

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Bibliography

Bundoo, S. K. (2011). Asset Price Developments in an Emerging Stock Market: The Case of Mauritius.

De BONDT, W.F.M. and THALER, R. (1985), Does the Stock Market Overreact?. The Journal of Finance, 40: 793-805. doi:10.1111/j.1540-6261.1985.tb05004.x

Chordia, T. and Shivakumar, L. (2002), *Momentum, Business Cycle, and Time-varying* Expected Returns. The Journal of Finance, 57: 985-1019. doi:10.1111/1540-6261.00449

Eugene F. Fama, Kenneth R. French, International tests of a five-factor asset pricing model, Journal of Financial Economics, Volume 123, Issue 3, 2017, Pages 441-463, https://doi.org/10.1016/j.jfineco.2016.11.004.

FAMA, E.F. and FRENCH, K.R. (1996), Multifactor Explanations of Asset Pricing Anomalies. The Journal of Finance, 51: 55-84. doi:10.1111/j.1540-6261.1996.tb05202.x

Griffin, J.M., Ji, X. and Martin, J.S. (2003), Momentum Investing and Business Cycle Risk: Evidence from Pole to Pole. The Journal of Finance, 58: 2515-2547. doi:10.1046/j.1540-6261.2003.00614.x

Hong, H., Lim, T. and Stein, J.C. (2000), Bad News Travels Slowly: Size, Analyst Coverage, and the Profitability of Momentum Strategies. The Journal of Finance, 55: 265-295. doi:10.1111/0022-1082.00206

JEGADEESH, N. and TITMAN, S. (1993), Returns to Buying Winners and Selling Losers: Implications for Stock Market Efficiency. The Journal of Finance, 48: 65-91. doi:10.1111/j.1540-6261.1993.tb04702.x

LAKONISHOK, J., SHLEIFER, A. and VISHNY, R.W. (1994), Contrarian Investment, Extrapolation, and Risk. The Journal of Finance, 49: 1541-1578. doi:10.1111/j.1540-6261.1994.tb04772.x

Lintner, J. (1965). Security Prices, Risk, and Maximal Gains From Diversification. *The Journal of Finance, 20*(4), 587-615. doi:10.2307/2977249

Moskowitz, T.J. and Grinblatt, M. (1999), Do Industries Explain Momentum?. The Journal of Finance, 54: 1249-1290. doi:10.1111/0022-1082.00146

Ornelas, Jose Renato Haas and Fernandes, Jose Luiz Barros, Momentum and Reversal Puzzle in Emerging Markets. Available at SSRN: https://ssrn.com/abstract=676392 or http://dx.doi.org/10.2139/ssrn.676392

Rouwenhorst, K.G. (1998), International Momentum Strategies. The Journal of Finance, 53: 267-284. doi:10.1111/0022-1082.95722

Rouwenhorst, K.G. (1999), Local Return Factors and Turnover in Emerging Stock Markets. The Journal of Finance, 54: 1439-1464. doi:10.1111/0022-1082.00151

Sharpe, W.F. (1964), CAPITAL ASSET PRICES: A THEORY OF MARKET EQUILIBRIUM UNDER CONDITIONS OF RISK*. The Journal of Finance, 19: 425-442. doi:10.1111/j.1540-6261.1964.tb02865.x