An Analysis of Stock Market Anomalies and Momentum Strategies on the Stock Exchange of Mauritius

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Contents

List of tables

Abstract

The Stock Exchange of Mauritius started operations in July 1989 and as at December 2006 there were 41 listed companies with a market capitalization of US$3,540.60 million. The market index is the Semdex. This study investigates whether the stock market anomalies such as day-of-the-week effect and the January effect are present on the Stock Exchange of Mauritius over the period January 2004 to December 2006. We find negative Tuesday returns but positive returns for other days of the week. However, when we control for the size effect and the value premium as per the Fama and French (1993) three-factor model, only the Friday effect remains significant. The possible profit opportunities on the SEM in terms of both economic and statistical significance are also investigated. Finally, the study investigated investment strategies based on momentum in returns on the Stock Exchange of Mauritius and how robust these strategies are after controlling for size and value. The mean excess returns are statistically significant at the 1% level for momentum portfolios. We also find strong support for the Carhart's (1997) model where the momentum factor is priced. The explanatory power of the momentum factor in fact dominates that of size and value.

Key words: Stock market anomalies, momentum, Stock Exchange of Mauritius.

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1. Introduction

The Stock Exchange of Mauritius (SEM) started operations in July 1989. It is composed of an Official Market and a Development and Enterprise Market [formerly the Over The Counter market (OTC)]. The trading activity of the exchange is administered by the Stock Exchange of Mauritius (SEM) Limited. The regulatory body is the Financial Services Commission (FSC). On the Official Market, the number of listed companies (equities) grew from six in December 1989 to 41 in December 2006, and the market capitalization increased from around US$93.26 million to US$3,540.60 million over the same period. Table 1 gives summary statistics on the market. The listed companies are classified into seven broad categories, namely banking, insurance and other finance, industry, investment companies, sugar, commerce, leisure and hotels, and transport. Banking, insurance and other finance, leisure and hotels and commerce account for around 60% of the total market capitalization.

The development of the infrastructure and improvement in the services offered by the exchange are crucial to boost the operational efficiency of the market, to mitigate the problem of liquidity and to attract both local and foreign investors. Major improvements in trading infrastructure are:

- A Central Depository and Settlement (CDS) system, a computerized system to speed up clearing and settlement, has been operational since November 1997. Transfer and settlement operations are carried out in a maximum of three days. It has also been linked to an automated clearing and settlement system, the Stock Exchange of Mauritius Automated Trading System (the SEMATS). The SEMATS was launched on 29 June 2001 to replace the traditional trading pattern (open-outcry trading floors).
- Initially, trading was twice a week, which was increased to three times a week in January 1994. However, with a view to improving market liquidity, as from 24 November 1997, the exchange trades daily on the official market. This has been possible with the coming into operation of the CDS.
- The SEM has also opened a website, allowing access to market information. Listing Rules were revised in February 2000. A new Securities Act 2005 was also introduced.

Since August 1994, with the suspension of the Exchange Control Act, foreigners can buy shares on the local market, provided they do not acquire a controlling stake. Foreign portfolio flows have been accounting for at least 30% of total turnover over the past few years. The Semdex, a value-weighted index, is the index of all listed ordinary shares. There are 11 stockbroking companies in operation. Trading on the exchange is done by an order-driven system. The brokerage fee claimed by stockbroking companies varies from 0.50% to 0.75%.

Table 1: Stock Exchange of Mauritius: Market highlights

	1989	1991	1994	1997	1999	2001	2004	2006
No. of listed companies (equities)	**6**	**19**	**34**	**42**	**43**	**40**	**40**	**41**
Mkt Cap (Rs billion)[1]	1.44	4.86	28.54	36.93	41.73	32.15	67.03	116.98
Mkt Cap ($)[2]	93.26	309.52	1,578.32	1,754.63	1,643.31	1,601.85	2,395.78	3,540.60
Turnover ratio (%)	0.97	1.67	5.45	8.11	4.74	10.24	4.21	5.12
SEMDEX	117.34	154.17	476.1	391.12	435.69	340.92	710.77	1,204.46
P/E ratio	6.56	6.12	20.11	12.86	8.98	5.91	9.93	11.95
Div yield (%)	5.42	5.11	2.08	3.62	5.03	8.30	4.84	3.66

1. Mkt cap stands for market capitalization
2. Market capitalization in million US dollars
Source: SEM Factbooks, various issues and author's computations.

We observe from Table 1 that there has been a consistent growth in the market index and hence in the market capitalization. However, the number of listed companies has not increased significantly since 1997 and the market is still characterized by low liquidity levels as confirmed by the turnover ratio.

This study contributes to the existing literature in several ways. First, it analyses stock market anomalies within an asset pricing model framework and in an emerging African stock market context. Second, the research will be valuable to fund managers, portfolio managers, arbitrageurs and the investing public at large. It must be stressed that this research is targeted mainly at practitioners/investors who are trading on the market; it demonstrates how the results can be useful to them in adjusting their trading strategies. If there are seasonal and other anomalies, can they profit from them? In a stock market with an annual turnover of around US$349 million; it is important to see whether there are certain patterns which can be exploited by investors. It will also provide valuable insights for market participants, regulators and policy makers. The study will also investigate investment strategies based on momentum in returns on the Stock Exchange of Mauritius.

Objectives of the study

The study:

- Tests whether stock market anomalies such as day of the week effect and the January effect are present on the SEM, particularly when controlling for systematic risk.
- Investigates whether the calendar anomalies persist when the size effect and the value premium, as per the Fama and French (1993) three-factor model, are controlled for.
- Investigates the possible profit opportunities on the SEM in terms of both economic and statistical significance.
- Investigates investment strategies based on momentum in returns on the Stock Exchange of Mauritius and how robust these strategies are after controlling for size and value.

2. Literature review

The Capital Asset Pricing Model (CAPM) expresses expected return on an asset as the sum of the return on the risk-free asset plus an expected premium for risk, where the risk premium is a function of the asset covariance with the market return (beta).

$$E(R_i) = R_f + ß_i E\,[(R_{m,t}) - R_f]] \tag{1}$$

The risk of a stock can be decomposed into two components. The first component is the systematic risk (beta), which is related to the overall market, and the second component is non-systematic risk, which is specific to the individual stock. The fundamental premise of the CAPM is that the market will reward only the holding of systematic risk as the unsystematic risk can be handled by holding a diversified portfolio of assets. Unfortunately, financial managers cannot directly observe beta but must estimate it. To estimate the beta of a firm, a time-series regression is used and requires the financial manager to select both a return interval and an estimation period.

In this study the daily return series will be used in order to estimate the company's beta. Given insufficient information on the daily risk-free rate, the market model will be used to estimate the beta and then an augmented market model will be used to consider the day-of-the-week effect and the January effect. The market model also overcomes some of the main limitations of the CAPM. The market model is as follows:

$$E(R_{i,t}) = \text{constant} + ß_i E\,[(R_{m,t})] \tag{2}$$

Fama and French three-factor model

The Fama and French (1993) three-factor asset pricing model was developed as a result of increasing empirical evidence that the Capital Asset Pricing Model performed poorly in explaining realized returns. Fama and French (1993) construct a three-factor asset pricing model for stocks that includes the conventional market (beta) factor and two additional risk factors related to size and book-to-market equity. They find that this expanded model captures much of the cross-section of average returns among US stocks.

According to the model, the expected return on a portfolio in excess of the risk-free rate is explained by the sensitivity of its return to three factors: (i) The excess return on a broad market portfolio; (ii) the difference between the return on a portfolio of small stocks and the return on a portfolio of large stocks (SMB); and, (iii) the difference between the return on a portfolio of high book-to-market stocks and the return on a portfolio of low book-to-market stocks (HML). The model is as follows:

$$(R_{pt}) = R_f + ß_p[(R_{mt}) - R_f] + s_p(\text{SMB}) + h_p(\text{HML}) + \mu_{\text{pt}} \quad (3)$$

where: (R_{pt}) is the weighted return on portfolio p in period t;

R_f is the risk-free rate;

$ß_p$ is the coefficient loading for the excess return of the market portfolio over the risk-free rate;

s_p is the coefficient loading for the excess average return of portfolios with small equity class over portfolios of big equity class;

h_p is the coefficient loading for the excess average returns of portfolios with high book-to-market equity class over those with low book-to-market equity class;

μ_{pt} is the error term for portfolio p at time t.

It can be seen that the Fama and French three-factor model is more like an extension of the CAPM. It includes the two factors identified by Fama and French (1992), firm size and book-to-market equity (BE/ME), in addition to the market factor. In fact, the model augments the CAPM model by the size effect and the book-to-market equity effect. The small firm effect is one of the most extensively studied anomalies in finance. The classic studies of the small firm premium are those of Banz (1981) and Reinganum (1983). The size effect is the empirical regularity with which firms with small market capitalization exhibit returns that on average significantly exceed those of large firms. The book-to-market equity effect shows that average returns are greater the higher the book value to market-value ratio (BE/ME) and vice versa. It is also referred to as the value premium.

However, Kothari et al. (1995) argue that a substantial part of the premium is due to "survivor bias"; the data source for book equity contains a disproportionate number of high-BE/ME firms that survive distress, so the average return for high-BE/ME firms is overstated. But a number of studies have weakened and even dismissed this survivorship-bias argument. For example, Fama and French (1993) find that the relation between BE/ME and average return is strong for value-weight portfolios. As value-weight portfolios give most weight to larger stocks, any survivor bias in these portfolios is trivial.

Another argument is that the results of Fama and French (1993) are due to data snooping, where researchers' fixation with search for variables that are related to average return, will find variables, but only in the sample used to identify them (MacKinlay, 1995). This criticism of the three-factor model does not hold. Since the Fama and French (1993) study, there have been many studies using different sample periods on US data and samples in different countries confirming the existence of the size and book-to-market equity effects. Barber and Lyon (1997) analyse the returns for a holdout sample of financial firms which Fama and French (1992) excluded from their analysis. They find that both financial and non-financial firms exhibit a significant size and book-to-market premium. They also present evidence showing that survivorship bias does not significantly affect the estimate of size and value premium for both financial and non-financial firms.

Fama and French (1996) investigate whether these anomalies disappear in the three-factor model. They find that except for the continuation of short-term returns, the anomalies largely disappear in a three-factor model. The three-factor model captures the returns to portfolios formed on E/P, C/P and sales growth.

Fama and French (1998) provide additional valuable out-of-sample evidence. They tested the Fama and French three-factor model in 13 different markets over the period 1975 to 1995. They find that 12 of the 13 markets record a premium of at least 7.68% per annum to value stocks (high BM/ME). Seven markets show statistically significant BM/ME betas.

Maroney and Protopapadakis (2002) tested the Fama and French three-factor model on the stock markets of Australia, Canada, Germany, France, Japan, the UK and the US. The size effect and the value premium survive for all the countries examined. They conclude that the size and BE/ME effects are international in character.

Faff (2001) uses Australian data over the period 1991 to 1999 to examine the power of the Fama and French three-factor model. He finds strong support for the Fama and French three-factor model, but also finds a significant negative rather than the expected positive premium to small size stocks. Faff (2001) concludes that his results appear to be consistent with other recent evidence of a reversal of the size effect.

Gaunt (2004) studies the Fama and French three-factor model in the Australian setting and provides further out-of-sample (non US) tests of the model. The study covers the period 1991 to 2000 and investigates firms listed on the Australian Stock Exchange. The explained variation as measured by the adjusted R^2 is also much higher compared with the CAPM. The author concludes that the three-factor model provides a better explanation of observed Australian stock returns than the CAPM.

Drew and Veeraghavan (2002) present evidence of the size and value premium for the case of Malaysia. They report that the factors identified by Fama and French explain the variation in stock returns in Malaysia and are not sample specific. The analysis was restricted to firms with available returns data from December 1992 to December 1999. The findings show that small and high book-to-market equity stocks generate higher returns than big and low book-to-market equity stocks in Malaysia. Returns on SMB and HML are substantially higher than those of the market. Their results also show that the explanatory power of the variables is powerful throughout the sample period and not solely in January. They therefore reject the presence of the turn-of-the-year (TOY) effect.

Calendar anomalies

The study of stock market anomalies has been one of the most captivating areas of financial market research during previous decades. Anomalies are empirical results that seem to be inconsistent with maintained theories of asset-pricing behaviour. They indicate either market inefficiency (profit opportunities) or inadequacies in the underlying asset-pricing model (Schwert, 2003). However, many of these studies have concentrated on US and European markets and a limited number on the Asian stock exchanges. Unfortunately, research on emerging African markets is practically non-existent.

Recent empirical evidence shows that anomalies such as the small-firm effect, turn-of-the-year effect, momentum effect, weekend effect and holiday effect still appear to exist (see, for example, Frieder and Subrahmanyam, 2002; Schwert, 2003; Lucey, 2005; Meneu and Pardo, 2004).

Evidence of Monday effect and day-of-the-week effect

Many empirical works have been conducted to test the existence of the Monday effect. Cross, 1973 (also cited in Ariel, 1987), using the Standard and Poors Composite Index, found that the mean return on Friday was 0.12%, but was -0.18% on Mondays, measured as the difference between Friday's closing price and Monday's closing price.

French, 1980 (also cited in Ariel, 1987) analysed the daily Standard and Poors 500 returns on all days of the week for the period 1953 to 1977, showing that the average Monday return was -0.17% and the mean return was positive for all other days of the week, with Wednesday and Friday having the highest returns.

Gibbons and Hess (1981) found a negative annualized return of 33.5% on Monday after examining returns for a 17-year period (1962 to 1978). Dividing the data into subperiods, they arrived at the same conclusion. Harris (1986) confirmed the negative Monday returns but argued that it exists only in the first 45 minutes of trading activity. Clare et al. (1995), using Kuala Lumpur Stock Exchange Composite Index (KLSE) data for the period from 3 January 1983 to 23 July 1993, showed that the average Monday return was -0.109%.

Alexakis and Xanthakis (1995) examined the day-of-the-week effect in the Greek stock market. This index was studied for the period 1988 to 1994, showing Monday and Tuesday negative average returns. They also found that the highest standard deviation of the returns distribution was observed on Mondays for all the time periods. By estimating the coefficient of variation for all the weekdays, the authors concluded that in the Athens Stock Exchange, Mondays have the highest risk.

Brusa et al. (2000) found during the subperiod 1966 to 1987 that the average Monday return for the DJIA was -0.130% and for the NYSE Composite was -0.150%. On the other hand, the average Monday return for the DJIA and the NYSE Composite indexes were 0.130% and 0.083% during the subperiod 1988 to 1996. They confirmed that while the "traditional" weekend effect exists during the pre-1988 subperiod, the effect was reversed during the post-1988 subperiod.

Mehdian and Perry (2001) examined the Monday effect in five major US equity indices. In the full sample period from 1964 to 1998 and a sub-sample period from 1964 to 1987, they confirmed that Monday returns were significantly negative and were lower than returns during the rest of the week. They found that the average Monday percentage return was -0.15% for the RUSSELL and -0.06% for the SP500.

A number of explanations have been put forward to justify the weekend effect. According to the information release hypothesis, information released during the week tends to be positive, whereas information released over the weekend tends to be negative. A firm with good news will release it quickly so that investors can bid the stock price up, but bad news is released after the Friday close. This suggests that delay in the announcement of bad news might cause the negative Monday effect. However, the evidence tends to indicate that delaying the announcement of bad news on Friday can only explain a small proportion of the weekend effect.

Another explanation for the negative weekend effect is that the delay between the trade date and the settlement date create an interest-free loan until settlement. Friday buyers get two extra days of free credit, creating an incentive to buy on Fridays and pushing Friday prices up. The decline over the weekend reflects the elimination of this incentive. This hypothesis is supported by the intra-week behaviour of volume and returns: Friday is the day with the greatest volume and the most positive stock returns.

Lakonishok and Levi (1982) attributed the effect to the delay between trading and settlement in stocks and in clearing cheques. However, they reported that only about 17% of the abnormally low Monday returns can be explained by the settlement period.

Miller (1988) attributes the negative returns over weekends to a shift in the broker–investor balance in decisions to buy and sell. During the week, Miller argues that investors, too busy to do their own research, tend to follow the recommendations of their brokers, recommendations that are skewed to the buy side. However, weekend investors, free from their own work as well as from brokers, do their own research and tend to reach decisions to sell. The result is a net excess supply at Monday's opening. Miller's hypothesis is supported by evidence showing that brokers do tend to make buy recommendations. Ziemba (1991) provides evidence for the same phenomenon in Japanese stock prices.

There are some studies documenting stock return seasonality in emerging African stock markets as well. In studying the turn-of-the-year effect using monthly market indices for the Ghanaian stock market (1991–1996), Nigerian stock market (1984–1995) and Zimbabwean stock market (1987–1995), Ayadi et al. (1998) found the absence of seasonality in stock returns on the Nigerian and Zimbabwean stock markets but confirmed the presence of seasonality in stock returns for Ghana. Furthermore, using the dummy-variable regression analysis approach, showed the presence of the January effect for Ghana but not for Nigeria and Zimbabwe.

Bhana (1985) found significantly negative average returns for Mondays and the highest positive returns on Wednesdays for shares traded on the Johannesburg Stock Exchange (JSE) for the period 1978 to 1983. Davidson and Meyer (1993) found that the Monday effect was no longer significant on the JSE using the All Share Index for the period 1986 to 1991. Bradfield (1990) found significant July and December month-of-the-year effects for the period January 1974 to December 1984. Roux and Smit (2001) investigated whether some seasonal patterns still exist on the JSE using the All Share Index, the All Gold Index and the Financial Index by comparing two periods, 1978 to 1989 with 1990 to 1998, and found that most of these anomalies no longer exist on the South African share market.

Mlambo and Biekpe (2006) investigated stock market seasonal effects on 17 indexes from nine African stock markets. Using regression analysis, significant Monday effects are found on two of Botswana's indices, the Foreign Companies Index (FCI) and the All Companies Index (ACI), and on the Morocco index. Significant turn-of-the-month (TOM) effects are also found on the FCI and ACI, and on the Egyptian and Mauritian indexes. The TOM effects disappeared for Egypt and Mauritius after removing the turn-of-the-year effects, suggesting that the TOM effects on these markets could be TOY effects. However, the TOY effects are significant only for Egypt and Zimbabwe's Industrial Index, but not for Mauritius.

The results indicate that Mondays give the lowest mean daily returns for Botswana's FCI and ACI, and for Zimbabwe's Industrial and Mining indexes, consistent with the literature. However, only the Monday returns for the FCI are significant at the 5% level. The lowest mean daily returns are observed on a Tuesday for Mauritius' SEMTRI, Morocco's index, Namibia's Local Index, and Tunisia's indexes, consistent with evidence from the Australian and Asian markets. The largest mean daily returns are observed on a Friday for the FCI and ACI (significant at the 1% level), Zimbabwe's Mining Index, Egypt's indices, and Mauritius' SEMTRI and Semdex. Although not all of them are significant, the evidence supports the literature that Fridays offer the highest mean daily returns compared with the other days of the week.

In a recent study, Chukwuogor-Ndu (2007) investigates the presence of the day-of-the-week effect, returns volatility and the annual returns of five African stock markets. The results show that the markets in Ghana and Nigeria have no negative returns during the trading days of the week. On the other hand, Botswana and Egypt have negative returns on Tuesday while the South African JSE Securities Exchange has a negative return on Wednesday. Botswana, Ghana and Nigeria experienced their highest return on Wednesday while Egypt and South Africa experienced their highest return on Monday. Botswana and Egypt recorded the lowest return on Tuesday, Ghana on Monday, Nigeria on Thursday and South Africa on Wednesday. The highest standard deviation of return occurred mostly on Friday for Ghana and Nigeria. The lowest standard deviation also occurred on Friday for Botswana and Egypt. There is also high volatility in returns. These results do not support the existence of the day-of-the-week effect on stock returns in the Botswana, Egypt, Ghana, Nigeria and South Africa stock markets as observed from an analysis of the daily returns for the period 1997 to 2004. It was also observed that in the markets of Botswana and Nigeria, and in South Africa's JSE All Share Index, the daily return seasonalities are not accompanied by any volatility seasonality and investing on low (high) return weekday does not necessarily mean that risk is also low or high.

Subadar (2008) investigates the day-of-the-week effect on the Stock Exchange of Mauritius, using observations as from July 1989, on a daily basis up to December 2006. The study shows that Friday returns appeared to be higher relative to other trading days. However, the empirical results further show that the mean returns across the five weekdays are jointly not significantly different from zero across all given years as well as for the whole sample.

January effect and month-of-the-year effect

A number of studies have also found that returns in January tend to be much higher compared with other months.

Rozeff and Kinney (1976) were the first to conduct a rigorous study documenting the existence of a January effect in the US. Using analysis of variance technique (ANOVA), they examine all stocks on the NYSE from 1904 to 1974. They found that the average return for the month of January was 3.48%. However, for the remaining 11 months of the year it was only 0.42%.

Keim (1983) shows that over the entire 1963 to 1979 period, the average difference between risk-adjusted returns of small and large firms is about 0.7% per day during January. Even more striking is that over the entire 1931 to 1978 period, the relation between daily abnormal returns and size is always negative and more pronounced in January than in any other month.

Keim and Stambaugh (1984) find that the Monday effect is similar for all size portfolios. Moreover, they found that mean close-to-close returns of small firms on Monday in January are positive and related to firm size. A large portion of day-of-the-week effects in January occur during the first five trading days of January, especially the Monday effect.

Schultz (1985), using the Dow Jones Average for the period 1900 to 1917, found an average difference between the abnormal returns for small and large firms of 8% during the first five days of January. Furthermore, he also shows that after adjustment for market returns, stockholders earned an extra 15% return for holding small firm stocks for just the first nine days of January.

Schwert (2003), documents the turn-of-the-year effect for the period 1962 to 2001. He estimates the January effect to be 0.4% per day over the periods 1980 to 1989 and 1990 to 2001, which is about half the size of the estimate over the 1962 to 1979 period. Thus, the January effect is still present in the US.

The January effect has been found to be present in other countries as well. Nassir and Mohammad (1987) and Balaban (1995) provide evidence that in Malaysia and Turkey, respectively, the average January returns were significantly positive and higher than in other months. Ho (1990), using daily returns for the period January 1975 to November 1987, found that six out of eight emerging Asian Pacific stock markets exhibit significantly higher daily returns in January than in other months. Fountas and Segredakis (2002) tested for seasonal effects in stock returns (the January effect anomaly) using monthly stock returns in 18 emerging stock markets for the period 1987 to 1995. They found very little evidence in favour of this effect in the emerging markets. Koutianoudis and Wang (2003) investigated the economic significance of the monthly seasonality in the Athens Stock Exchange, and found very significant January effects in this market. Maghayereh (2003) finds no evidence of monthly seasonality or the January effect in the Amman Stock Exchange (Jordan).

Brown et al. (1983) claimed that the tax-loss hypothesis largely explains the January effect. However, the tax-loss explanation of the January effect has been heavily challenged. For example, Gultekin and Gultekin (1983) studied the stock markets of 15 different countries, including the UK, which has a tax year-end in April, and Japan with no capital gains tax. In all the markets January returns were relatively higher than the rest of the year. Balaban (1995) reports a January effect for Turkey although it does not have any capital gains tax. K.C. and Joshi (2005) find an October effect for the Nepalese stock market, against the tax-loss selling hypothesis.

We conclude that the tax-loss selling hypothesis is not a satisfactory explanation for the January effect. The January effect, therefore, remains an unexplained puzzle.

The theoretical explanation of the January effect can be summarized in three strands of thought. The first explanation of this effect was provided by the tax-loss selling hypothesis. The second explanation of the January effect suggests that abnormal returns in January are due to new information provided by firms at the end of the year. The third explanation is based on the existence of a positive January risk-return trade off.

Some anomalies are found to be correlated with the size effect. For example, the size effect is closely linked to the January effect in the United States. Keim (1983) found that one-quarter of the extra returns earned by the smallest firm in the US was during the first five trading days of January. Therefore, in the United States, the January effect has gained considerable acceptance as an explanation for the size premium. However, such a relationship between the size and the January effect has not always been observed in other stock markets. For example, in the UK small firms have outperformed large ones, although there is no evidence of a January-size seasonality.

Given the scarcity of research on emerging African stock markets in these areas, this study investigates some of the seasonal anomalies on the Stock Exchange of Mauritius. The paper therefore provides additional evidence on anomalies in emerging markets. This is also an in-depth study on some 'calendar anomalies in emerging markets linking with asset pricing models'. To my knowledge, this has not been done for emerging African stock markets.

Momentum in stock returns

Momentum is one of the strongest and most challenging asset pricing anomalies. Persistent momentum profits have attracted considerable attention from investment researchers and practitioners as they pose a challenge to the efficient market hypothesis. The momentum effect is based on the idea that stocks with high returns in the recent past have higher future returns than stocks with low past returns. The momentum effect is typically defined as a positive relation between the return of a stock in a certain period with its lagged return, both relative to the cross-sectional sample mean. A momentum strategy, therefore, involves buying past winners and selling past losers.

Jegadeesh and Titman (1993) show that investment strategies (referred to in finance literature as momentum strategies) that buy stocks which performed well over the previous three to 12 months and sell stocks that performed poorly over the same time period have historically earned profits of about 1% per month for the US market over the following three to 12 months.

Since this influential work a number of other studies have confirmed and extended this result. A number of explanations have been suggested to account for momentum. Some authors have suggested that momentum profits are solely due to data snooping bias. Jegadeesh and Titman (2001), using data over a sample period subsequent to their earlier paper, show that a momentum strategy continues to be profitable. This result may be taken as evidence against the data-snooping argument.

Others argue that it is premature to reject rational models and suggest that the profitability of momentum strategies may simply be a compensation for risk. They investigate whether the excess returns generated by the momentum strategies could be due to a positive CAPM beta in the zero-investment momentum strategy. They argue that the returns associated with momentum strategies are attributable to risk that may not have been explained by traditional measures, such as the capital asset pricing model and more recent measures like the Fama and French (1993) three-factor model. Jegadeesh and Titman (1993) have tried to explain momentum as a reward for risk. The explanation merits serious consideration because the winners (past good performers) and the losers (past poor performers) are classified on the basis of past returns.

Fama and French (1996) fail to price the momentum profits by exposures to the risk factors in the three-factor unconditional asset pricing model by Fama and French (1993). Their results are confirmed by Jegadeesh and Titman (2001). Back, Green and Naik (1999) develop a theoretical model whereby cross-sectional dispersion in risk and expected returns generates momentum profits.

In addition, Conrad and Kaul (1998) provide empirical results and simulations that lead them to conclude that momentum profits are explained by cross-sectional differences in expected returns rather than any time-series patterns in stock returns. One prediction of this explanation would be that the return to a momentum strategy would be positive, on average, for the entire post-ranking period. Evidence to the contrary in the US is provided by Jegadeesh and Titman (2001), who show that the performance of momentum portfolios 13 to 60 months post formation is negative. They attribute the Conrad and Kaul results to small sample biases in their empirical tests.

The lack of a straightforward risk-based explanation of the momentum effect has led to studies in which the trading behaviour of investors is analysed in further detail. The behavioural models developed by Barberis et al. (1998), Daniel et al. (1998), and Hong and Stein (1999) argue that momentum profits arise because of inherent biases in the way that investors interpret information.

It argues that investors either under-react or belatedly over-react to firm-specific news. Barberis et al. (1998), Daniel et al. (1998) and Hong and Stein (1999) all develop behavioural models inspired, in part, by the same interpretation.

Chan et al. (1996) attribute momentum to firm-specific events in that investors either under-react to information or that positive feedback trading causes a delayed over-reaction to information.

Instead of focusing on individual stock momentum, several studies focus on the momentum effect while first grouping stocks on firm characteristics such as country, industry, size or value.

Richards (1997) investigates momentum and contrarian strategies at the country index level, and concludes that the momentum effect of 0.57% per month at the six-month horizon is statistically insignificant. Chan et al. (2000), in contrast, find a significant excess momentum return of 0.46% per month (*t* value 2.35). This difference could be explained by a different sample period, a different set of countries and different portfolio construction, but it is impossible to determine the exact cause without further investigation.

The findings of Bhojraj and Swaminathan (2001) are consistent with the qualitative results by Chan et al. (2000), suggesting that momentum on a country level exists. They find significant excess returns for their total sample of 38 countries, as well as the sub-sample with only 16 developed countries. They document that ranking countries on their local return improves a momentum industry on the country index level. These studies estimate the momentum effect using countries as the investable assets.

Moskowitz and Grinblatt (1999) claim that the momentum effect can be explained solely by momentum in industry returns. They report that, after correcting for industry effects, return continuation disappears. Several other studies have investigated their claim, but come to a different conclusion. For example, Lee and Swaminathan (2000) indicate that correcting for industries weakens the individual momentum results from 12.5% to 10.1% per annum, implying a decline of only 20%. Grundy and Martin (2001) indicate that industry momentum captures only half the size of the individual momentum effect.

Lewellen (2002) and Chordia and Shivakumar (2002) also find significant industry momentum, but the individual momentum effect is still present in their sample after controlling for industry momentum.

Swinkels (2002) finds empirical evidence for the existence of industry momentum in Europe, but not for the Japanese stock market. Nijman et al. (2004) investigate country, industry and individual stock momentum effects for the European stock market simultaneously. They aim to separate country and industry components. Their results suggest that the individual momentum effect is most pronounced, followed by industry momentum, while country momentum is virtually non-existent.

Lee and Swaminathan (2000) investigate the relation between trading volume and momentum in more detail. They indicate that stocks with high past turnover exhibit stronger momentum effects than stocks with low past turnover. In addition, they define early and late stage momentum strategies. Early stage momentum refers to buying low-volume winners and selling high-volume losers, while the late stage momentum strategy refers to buying high-volume winners and selling low-volume losers. The early stage strategy has substantially higher returns over the past first year, 16.7% versus 6.8% per annum for the late stage strategy, and dissipates slower in the subsequent years. The relation between trading volume and momentum for the German stock market is analysed in similar fashion by Glaser and Weber (2003). They confirm the hypotheses from Lee and Swaminathan that momentum is more pronounced for stocks with high turnover.

Momentum, size and value

The relation between return momentum to firm size and value has also attracted research interest and is partly the focus of this project. In Jegadeesh and Titman (1993, 2001), momentum is investigated for different size groups. First, they divide their sample into three sub-samples based on firm market value and form momentum portfolios (Jegadeesh and Titman, 1993) and obtain significant excess returns for each of the three sub-samples. In the second study, Jegadeesh and Titman (2001) divide their sample into small and large cap, based on the medium NYSE market capitalization. They find that the momentum effect is more pronounced for small cap stocks.

Hong et al. (2000) investigate the relation between momentum and size in more detail. Hong et al. examine the momentum effect by dividing the sample into three momentum portfolios instead of 10. Most papers find that momentum is more pronounced for extreme stock returns which might reduce the strength of the results of Hong et al. (2000). Nevertheless, they find that momentum is non-existent in the 30% stocks with highest market value. Since most institutional investors are confined to investing in this group of stocks, for them the presence of momentum in these large cap stocks would be most relevant. In addition, Hong et al. (2000) examine the relation between analyst coverage and momentum, and find that the momentum effect is stronger for firms with low analyst coverage, even when controlling for firm size. For the smallest decile, which is excluded in Jegadeesh and Titman (2001), Hong et al. (2000) report return reversals instead of momentum. The weaker momentum effect for value-weighted momentum portfolios instead of equally weighted portfolios is also an indication that large stocks exhibit less momentum; (see for example Moskowitz and Grinblatt (1999) who find 9.3% and 5.2% per annum for equally and value-weighted momentum portfolios, respectively).

In an international context, Rouwenhorst (1998) finds that, for his European sample, the momentum effect is somewhat stronger for small stocks, confirming the findings of Jegadeesh and Titman.

Nijman et al. (2004), in addition to investigating country, industry and individual stock momentum effects for the European stock market, find that interaction effects with size and value are important in combination with momentum. In particular, their results indicate that momentum is most pronounced for small growth stocks. The results on the relative importance of country, industry and individual stock factors are unaffected by the inclusion of size and value.

Next to an industry classification, Lewellen (2002) also uses size, value and size-value sorted portfolios as investable assets. Lewellen reports medium-term return continuation for all these classifications. From these results, Lewellen concludes that the momentum effect cannot be attributed to momentum in firm-specific or industry-specific returns.

Carhart (1997) augments the Fama and French three-factor model by including a momentum factor when investigating momentum for a sample of mutual fund companies. The model tends to explain all momentum profits. The author argued that it is probable that the momentum factor proxies for other missing risk factors that may be related to company characteristics, such as dividend yield, earnings yield, leverage, volume and past sales growth.

There is thus a solid body of literature documenting that momentum is a robust and pervasive feature of US stocks, and there is evidence (Rouwenhorst, 1998) to suggest the presence of momentum in European markets. But the empirical evidence relating to the sources of momentum profits can, at best, be described as mixed. However, the evidence that momentum strategies work is convincing. As with size and value strategies, however, the explanation of why they work is largely incomplete.

For this study, therefore, we will also use the model developed by Carhart (1997), which includes an additional momentum factor besides the Fama and French factors. The momentum factor is constructed as the difference between the returns on the winners' portfolio and the returns on the losers' portfolio for a given set of financial assets, that is, P3-P1 for momentum in returns only, SP3-SP1 for momentum in returns among small capitalization stocks, BP3-BP1 for momentum in returns among big market capitalization stocks and so on.

Given the scale of the recent interest in momentum and the fact that no single persuasive explanation for the phenomenon has emerged, it is therefore interesting to investigate this phenomenon in an emerging African stock market, namely the Stock Exchange of Mauritius. As a consequence, this paper fills to some extent the gap in the literature by investigating the momentum investment strategies by using the equity stocks

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \gamma_{i,JAN} D_{JAN} \tag{5}$$

D_{JAN} = a dummy variable which equals one in January, zero otherwise.

The above two models were also run with the market return (Semdex Return) as the dependent variable.

Fama and French three-factor model with calendar effects

The Fama and French three-factor model was also similarly augmented to take into account the January effect and the day-of-the-week effect respectively. The risk-free rate was proxied by using the weighted 91-day Treasury Bill rate. This was converted on a daily/monthly basis (depending on the analysis being done) so that they matched the same time interval as the share returns. The portfolio return was daily (or monthly) over the period January 2004 to December 2006.

The models were as follows:

$$(R_{pt}) - R_f = \text{const} + ß_p[(R_{mt}) - R_f] + s_p(\text{SMB}) + h_p(\text{HML}) + \gamma_{p,JAN} D_{JAN} + \varepsilon_{pt} \tag{6}$$

$$(R_{pt}) - R_f = ß_p[(R_{mt}) - R_f] + s_p(\text{SMB}) + h_p(\text{HML}) + \alpha_{1p}\text{MON} + \alpha_{2p}\text{TUES}$$
$$+ \alpha_{3p}\text{WED} + \alpha_{4p}\text{THURS} + \alpha_{5p}\text{FRI}\ \varepsilon_{pt} \tag{7}$$

The methodology used by Fama and French (1993) and others requires that the stocks be split into classes according to size and book-to-market equity ratio.

Classification by size

The stocks are divided into two classes: Stocks of small market equity and stocks of big market equity, where market equity (ME) = stock price times the number of issued ordinary shares. The median size of the whole sample is used as the breakpoint to establish the difference between the two classes. Firms with market equity less than the median value of all firms' market equity are considered small market equity firms and those with values greater than the median value are considered big market equity firms.

listed in an emerging market.

3. Data collection and methodology

The share price and market index data for the study were obtained from the Stock Exchange of Mauritius. However, the data were not in a form suitable for empirical analysis and therefore the databases had to be prepared. Various issues of the SEM Factbooks were used for descriptive statistics about the market in general. Companies' annual reports were obtained from the listed companies for the years 2004 to 2006. The annual reports were collected from the individual companies.

The daily share prices were used to investigate the calendar anomalies. Daily returns were computed over the period January 2004 to December 2006. The daily returns were estimated as follows:

$$R_{i,t} = (P_{i,t} - P_{i,t-1})/P_{i,t-1}$$

where

$R_{i,t}$ is the return of company i on day t

$P_{i,t}$ is the price of company i on day t

$P_{i,t-1}$ is the price of company i on day t-1

Market model with calendar effects

The models below were used to estimate the betas of the listed companies by taking into account the day-of-the-week effect and the January effect. We first took into account the day-of-the-week effect. Next the January effect was investigated.

$$R_{i,t} = \beta_i R_{m,t} + \alpha_{1i}MON + \alpha_{2i}TUES + \alpha_{3i}WED + \alpha_{4i}THURS + \alpha_{5i}FRI + e_{i,}t \qquad (4)$$

where $R_{i,t}$ = return on share i at time t

$R_{m,t}$ = market return at time t

$e_{i,t}$ = the error term

β, α_1 to α_5 = are coefficients

MON to FRI are dummy variables which equals 1 on that day, zero otherwise.

Note: since we included five dummies, we did not need to include a constant term. This is the approach in the literature.

basis of cumulative monthly returns only, then on the basis of market capitalization, and finally on book equity to market equity and then within each stratification, momentum portfolios are constructed.

Within a given band, the construction of momentum portfolios follows closely the method described in Jegadeesh and Titman (1993).

More specifically, we first investigated whether there were momentum patterns in portfolios based on cumulative monthly returns only. The securities were classified into three portfolios based on return momentum only: The best performers (P3); the average performers (P2); and the worst performers (P1). We determined whether the best performers earned statistically significant mean excess returns. This was done for investment strategies of different time horizons: 6 months/6 months strategy, 6 months /12 months, 12 months /12 months and 12 months/6 months strategies.

Next we explored the momentum patterns in size portfolios. The securities were ranked on the basis of market capitalization, using the median as the break point. The ranked securities were classified into two groups: Small (below median) and big (remaining). Three momentum portfolios were formed for small stock portfolios (SP1 to SP3) and three for big stock portfolios (BP1 to BP3) respectively. The mean monthly returns on the momentum portfolios were then estimated from January of year t to June of year t + 1. The portfolios were then rebalanced on the basis of size after every year and then on the basis of past cumulative returns.

We finally ranked the sample securities on the basis of book equity to market equity. The securities were classified into two groups: Low and high book equity to market equity, again using the median as the break point. We similarly formed three low BE/ME portfolios (LP1 to LP3) and three high BE/ME portfolios (HP1 to HP3). The portfolios were rebalanced every year on the basis of the median BE/ME and with respect to momentum within each category on the basis of cumulative monthly returns.

Momentum profits and asset pricing models

We used the Fama-French three-factor model and augmented it by a momentum factor, to see whether the latter is priced or subsumed by the size and value premium factors. This is in fact the model developed by Carhart (1997). Fama and French (1993) developed a three-factor model comprising the excess market return (Rm – Rf), a size factor (SMB) and book equity to market equity, BE/ME (HML). For this part of the analysis, we used monthly data from January 2002 to December 2006.

The augmented model was as shown below with the momentum factor (UMD) constructed as the difference between the returns on the winners' portfolio and the returns on the losers' portfolio for a given set of financial assets, for example SP3 less SP1 for momentum portfolios involving small stocks, BP3 less BP1 for momentum portfolios for large stocks, and so on. The other explanatory variables were as explained in Equation 3.

$$(R_p t) - Rf = \alpha_p t + \beta_p (Rmt - Rf) + s_p (SMB) + h_p (HML) + m_p (UMD) + \varepsilon_p t \qquad (8)$$

Classification according to book-to-market equity

Fama and French classified the stocks into three groups of portfolios: Low book-to-market equity (BE/ME) ratio, medium BE/ME ratio and high BE/ME ratio. Stocks below the 33.33% of the median BE/ME ratio are considered as low book equity portfolios, those between 33.33% and 66.66% are medium portfolios and those above 66.66% are high portfolios. The split of the stocks into different categories (three BE/ME groups and two ME groups) was arbitrary and Fama and French argued that there was no reason why tests should be sensitive to this choice. Following this argument and given our small sample size, only two classes of book equity to market equity (BE/ME) value (low BE/ME and high BE/ME) are created. The group of stocks of low BE/ME will be those with BE/ME values below or equal to the median BE/ME and those of high BE/ME will be the stocks with BE/ME values greater than the median BE/ME.

Using this type of classification, it is possible to construct four portfolios: WHS (High book/Small mkt cap), WHB (High book/Big mkt cap), WLS (Low book/Small mkt cap) and WLB (Low book/Big mkt cap). For our analysis we therefore used the four constructed portfolios (WHS, WHB, WLS, WLB). Value-weighted returns were then calculated for each portfolio for each day over the period January 2004 to December 2006.

Methodology on momentum

The momentum issue is being considered in the context of investors being able to exploit these patterns: Momentum as an anomaly and as a potential trading strategy for investors. Moreover, it would be appropriate to test whether the momentum factor is priced when using standard asset pricing models.

Momentum is investigated within three separate bands. Stocks are sorted first on the

SEMDEX		.7975E-3		.9621E-3	.9692E-3	.8994E-3
t-statistic		2.2597		2.7333	2.7456	2.5739
p-value		[.024]		[.006]	[.006]	[.010]

At Company Level

BANKS &INSURANCE

CODE	**’eta (²)**	***Mon***	**Tues**	**Wed**	**Thurs**	**Fri**
BAI	0.56751					
	(3.9032)					
MCB	0.80087					
	(7.2367)					
MEI	0.10052	0.001433		0.0015625		
	(1.9221)	(1.9548)		(2.1335)		
MUA	0.35072			-0.0030096		
	(1.8100)			(-1.7530)		
SBM	0.80909					
	(7.9721)					
SWAN	0.25754			0.0010906		0.0013591
	(3.6926)			(1.7799)		(2.2351)
COMMERCE						
COURTS	0.31166					
	(1.6264)					
HM	0.26536					0.0031609
	(1.7563)					(2.3823)
HWF						0.0014396
						(1.7137)
IBL	0.69366					
	(6.1489)					
ROGERS	0.55595					
	(6.0121)					
SHELL	0.63914	-0.002294				
	(4.8526)	(-1.8647)				
INDUSTRY						
PIM		0.0014460				
		(1.7554)				
UBP	0.12446					
	(2.0972)					

continued next page

Table 3 Continued

4. Analysis of results

In the first part of this section , the day-of-the-week effect is tested mainly to see whether there is a negative Monday effect and positive Wednesday and Friday effects. This is done at both the company level and market index level. Then the January effect at both company and market index level is investigated. In the analysis, other month-of-the-year effects at market and at portfolio levels will also be explored. However, statistical significance alone is not enough; one must also assess its economic significance, and this is also done. The next part presents and discusses the results of a similar analysis as above, but using the Fama and French three-factor model as the benchmark. The final part presents and discusses the results in relation to the momentum strategies on the Stock Exchange of Mauritius. The regressions showing serial correlation were corrected using the Cochrane-Orcutt procedure. Those showing heteroscedasticity were corrected using the White's heteroscedasticity consistent variances and standard errors.

Day-of-the-week effect and the January effect

Investigation of way-of-the-week effect

Table 2 reports the daily mean and standard deviation for the five trading days of the week for the market index (the Semdex). We see that the highest daily return was observed on Wednesday, followed by Friday. Surprisingly, Monday also recorded a positive daily return. Yet the coefficient of variation (CV) for Wednesday was the lowest and for Friday second lowest. This is a first indication that higher returns on Wednesdays and Fridays cannot be explained by higher risk on these days.

Table 2: Daily mean and standard deviation of return for market index

Market Return	Mon	Tues	Wed	Thurs	Fri
Mean	0.000816	0.000499	0.001015	0.000841	0.000961
Std Deviation	0.003774	0.004189	0.003971	0.004450	0.004409
CV	4.625	8.39479	3.912315	5.29132	4.587929

Source: Author's computations.

An interesting issue, therefore, is to investigate whether statistically we observed the same tendencies when we analysed the day-of-the-week effect at the market index level. These results are presented in Table 3. When the Semdex return is run on the trading days of the week, we found, surprisingly, a positive and statistically significant Monday effect. We also found a statistically positive and stronger effect for Wednesday, Thursday and Friday. They ranged from 0.07975% to 0.09692%.

Table 3: Day-of-the-week effect at market level and at company level

AT MARKET LEVEL

companies display these regularities.

Only four companies showed a statistically significant Wednesday effect. Seven companies recorded a positive and statistically significant Friday effect. The magnitude of the positive Wednesday and Friday effects ranged from 0.135915 to 0.43010%.

Initially the extra returns may not seem to be economically significant, yet when analysed on a yearly basis, they compensate adequately for market frictions. This can be seen from the results in Table 4.

Table 4: Measuring the economic significance of the daily effect

Market index	Monday	Wednesday	Thursday	Friday
Extra daily return (%)	0.07975	0.09621	0.09692	0.08994
Extra yearly return (%)	3.828	4.61808	4.65216	4.31712

Source: Author's computations.

The transaction costs amounted to 1.25% to 1.50% for round trip transactions. This conveys to the investor the extra returns on the different days of the week, the highest being on Thursday, Wednesday and Friday. The results in terms of magnitude and statistical significance are generally in conformity with those reported in the literature.

The results could also be useful to the regulators to see what they can further improve in terms of market micro-structure in order to increase market efficiency.

However, we earlier cautioned against reading too much into the results, since only a few companies displayed a day-of-the-week effect. At market level, the daily extra return for four days of the week when annualized were more or less the same. This points more in the direction of a liquidity premium, given that the SEM is an emerging market that is characterized by low liquidity (see the turnover ratio in Table 1), in particular for the small capitalization stocks. We also have not yet controlled for the size effect and the value premium as per the Fama and French three-factor model. Will the day-of-the-week effects persist? Except for the Friday effect, the other day-of-the-week effects disappeared. These results are consistent with Mlambo and Biekpe (2006) who found overall statistically-positive Friday returns on many African stock markets including the Stock Exchange of Mauritius. Based on the evidence, a more plausible explanation for the Friday effect is the settlement hypothesis where Friday buyers get two extra days. This has been substantially confirmed in previous empirical work (see, for example, Ariel, 1987; Mlambo and Biekpe, 2006).

Testing for the January effect

When investigating for the January effect, we found that only seven companies recorded a January effect with one of them showing a negative January effect with statistical significance at 10% level or better (Table 5). The constant term captured the effect of the remaining 11 months of the year. Eight companies recorded a positive effect for the other months of the year, with statistical significance at 10% level or better.

However, when the January effect was investigated at market level, it was significant at the 5% level and with a coefficient of 0.0011796. For the remaining months of the year, the effect was stronger in terms of magnitude (0.6969E-3) and also statistically

At Company Level

BANKS &INSURANCE						
CODE	**'eta (²)**	***Mon***	**Tues**	**Wed**	**Thurs**	**Fri**
			INVESTMENTS			
BMH	0.50131 (0.57729)	0.017889 (2.3727)				
FINCORP	0.73707 (5.1244)					0.0024843 (1.9939)
GIDC	0.12017	0.0013623 (1.6830)		0.0023194 (2.8710)		
NIT	0.25410 (2.5810)	-0.001526 (-1.7188)				0.0014585 (1.6583)
PAD	0.63578 (5.1594)			0.0033155 (2.9578)		
POLICY	0.58992 (4.3735)					
UDL	0.75768 (4.0524)					0.0043010 (2.5414)
			LEISURE & HOTELS			
NMH	0.64725 (7.4396)					
SUNRES	0.22417 (2.8672)					
			SUGAR			
HF	0.38768 (2.0351)					0.0041970 (2.5510)

NB: Only coefficients which are statistically significant at the 10% significance level or better are reported; t-statistics in parentheses.
Source: Author's computations.

When we analysed the seasonal anomalies at the market level, we managed to do it. However, we were unable to determine which of the companies or sectors were driving these anomalies. Ideally, we should have investigated the sector indexes, but unfortunately the data were not available. Practitioners do not trade on the market index; hence the motivation to perform the analysis at company level, to see which companies may be driving these results. This would be valuable information to practitioners.

Only six companies recorded a Monday effect, which was statistically significant at the 10% level or better. Four companies, however, showed a positive Monday effect. One company showed a significant negative Tuesday effect. This could be due to the time zone hypothesis. These results are consistent with those of Alexakis and Xanthakis (1995) and Mlambo and Biekpe (2006). It could also be that economic agents learn and in the process this leads to a migration of the Monday effect to Tuesday. However, we must be cautious not to read too much into the data, since at company level, only a few effect. Unfortunately, no July effect was observed at market level, though we did find a July effect for some companies.

Month-of-the-year return

The results above prompted us to delve further by analysing the daily return by month of the year. Table 6 gives information on the mean daily return and standard deviation of return for the different months of the year. The highest mean return was surprisingly in September (0.2402%), followed by January (0.1847%) and August (0.1523%).

Table 6: Daily market return by month

Month	JAN	FEB	MAR	APR	MAY	JUN
Daily mean	0.001847	0.000781	0.000412	-0.0004	0.000161	0.000975
Std. deviation	0.003614	0.004224	0.003522	0.004198	0.002995	0.003727
Month	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**
Daily mean	0.000575	0.001523	0.002402	-0.00027	0.001159	0.000138
Std. deviation	0.002628	0.00399	0.006454	0.004083	0.002084	0.002919

Source: Author's computations.

To assess the statistical significance of the daily return by month, the Semdex return was regressed on the 12 months of the year. The results are reported in Table 7.

Table 7: Investigating month-of-the-year-effect on SEM

Dependent variable is RSEMDEX

Month	Coefficient	T-Ratio[Prob]
JAN	0.0015258	2.1035[.036]
FEB	0.9102E-3	1.2642[.207]
MAR	0.2433E-3	0.35877[.720]
APR	-0.5954E-3	-0.87178[.384]
MAY	0.4210E-3	0.62529[.532]
JUN	0.0010380	1.5528[.121]
JUL	0.3524E-3	0.51993[.603]
AUG	0.0015408	2.3057[.021]
SEP	0.0024614	3.4393[.001]
OCT	-.2647E-3	-0.31676[.752]
NOV	0.0011358	1.3139[.189]
DEC	0.3357E-3	0.40585[.685]
R-Bar-Squared 0.098511		
DW-statistic 1.9996		

Source: Authro's computation.

September had the highest statistical significance, followed by August and January (Table 7). It seems there is a predominant September effect in Mauritius. This presupposes that we go back to the company level regressions and include separate dummy variables for August and September, in addition to January. But, given the space constraint and in light of the above information, this was performed at the portfolio level.

significant at the 1% level.

Table 5: Investigating the January effect at company and market level

CODE	Constant	*Beta* (β)	January	CODE	Constant	*Beta* (β)	January
	BANKS AND INSURANCE				**INVESTMENTS**		
BAI		0.55313 (3.8065)		FINCORP		0.75425 (5.5025)	
MCB	0.5583E-3 (1.6902)	0.79964 (8.5983)		GIDC	0.8771E-3 (1.9042)		
MEI	0.0012567 (3.5970)	0.087744 (1.0690)		LIT	0.8832E-3 (2.6011)		
MUA		0.36943 (1.9085)		NIT	0.25102 (2.5537)		
SBM		.81961 (8.0760)		PAD	0.0012443 (1.9305)	0.64230 (5.2530)	0.0036274 (1.6932)
SWAN	0.7396E-3 (2.5732)	0.24309) (3.4731		POLICY		0.58286 (4.3392)	
				UDL	.0019164 (2.5522)	.77942 (4.1737)	
	COMMERCE				**LEISURE & HOTELS**		
COURTS		0.32416 (1.6952)		ASL			0.0034864 (1.7920)
HM		0.28205 (1.9210)	-0.004657 (-1.8049)	NMH		0.64685 (7.4639)	
ROGERS		0.53980 (5.9394)	0.0021514 (1.6078)	SUNRES		0.22428 (2.9057)	0.0022472 (1.8100)
SHELL		0.62049 (4.7253)			**SUGAR**		
	INDUSTRY						
				HF		0.42247 (2.2180)	0.0024578 (2.4400)
GCIVIC	0.7404E-3 (1.9958)			MTMD		0.48115 (3.8317)	
UBP		0.11795 (1.9843)		MOUNT		0.29066 (2.0217)	
					TRANSPORT		
				AMTS		0.24133 (1.9534)	0.0049047 (2.5549)
SEMDEX	0.6969E-3 4.4271		0.001179 62.1993				

NB: Only coefficients which are statistically significant at the 10% level or better are reported. Source: Author's computation.

In Mauritius the tax year ends in June. Given that at company level the January effect is not that pervasive, the above results persuade us to investigate whether there is a July and therefore companies in the hotel industry, transport, commerce and banking sectors are expected to perform better in this latter part of the year.

Investigation of stock market anomalies and abnormal returns with the Fama and French three-factor model

The standard Fama and French three-factor model

First, the standard Fama and French three-factor model is run to investigate whether the constant term is significant. This would indicate the possibility of earning abnormal returns. Table 10 shows the results for the Fama and French (1993) three-factor model for the Stock Exchange of Mauritius. Beta is significant for all the portfolios, but is less than one. This is consistent with the findings of Gaunt (2004). The signs of the coefficients for all the portfolios are as expected and statistically significant at the 1% level. The s coefficient is positive for all the small market equity portfolios (L/S and H/S) and becomes negative for all the high market capitalization portfolios (L/B and H/B), thus confirming the existence of the small firm effect. Similarly, the h coefficient is negative for the low book-to-equity portfolios (L/S and L/B) and becomes positive for the high book-to-equity portfolios. The SEM also confirms the existence of the value premium. The adjusted R^2 ranges from 37.86% to 68.12%. Our findings are consistent with those of Fama and French (1993), Drew and Veeraghavan (2002) and others.

Table 10: Results for the Fama and French three-factor model on the Stock Exchange of Mauritius

Model: $(R_p t) - Rf = \alpha_p t + ß_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + \varepsilon_p t$

Portfolios excess returns	α coefficient	β coefficient	*s* coefficient	*h* coefficient	Adj. R^2
WSL	0.5318E-3	0.33326	0.36720	-0.32541	0.37860
t-ratio[p-value]	2.3010 [.022]	6.4870 [.000]	19.3648 [.000]	-19.4462 [.000]	
WBL	0.00094328	0.34611	-0.53675	-0.51345	0.56323
t-ratio[p-value]	5.5071 [.000]	3.9627 [.000]	-13.9937 [.000]	-13.0982 [.000]	
WSH	0.00094328	0.34611	0.46325	0.47355	0.44817
t-ratio[p-value]	5.5071 [.000]	3.9627 [.000]	12.0775 [.000]	11.7821 [.000]	
WBH	0.5318E-3	0.33326	-0.63280	0.58259	0.68123
t-ratio[p-value]	2.3010 [.022]	6.4870 [.000]	-13.713 [.000]	13.4816 [.000]	

Source: Author's computation.

When we analysed the constant term, we observed that for two portfolios, WBH and WSL, the constant term was statistically significant at the 5% level and provided an extra return of around 0.0532%. Similarly, for portfolios WBL and WSH we observed

However, a variable deletion test indicated that only September remained significant as reported in Table 8, with statistical significance at the 1% level. This was taken into account when analysing the Fama and French three-factor model regressions for the four portfolios.

Table 8: Investigating month-of-the-year effect

Dependent variable is RSEMDEX

Regressor		Coefficient	T-Ratio[Prob]
K		.3957E-3	1.4928[.136]
JAN		.0010896	1.4080[.160]
AUG		.0011459	1.5911[.112]
SEP		.0021016	2.7439 [.006]
DEC		-.8794E-4	-.10089[.920]
R-Bar-Squared	0.080940		
DW-statistic	1.9999		

Source: Author's computation.

Table: 9 Measuring economic significance of the month-of-the-year effect

Semdex	January	September
Daily Extra Return %	0.15	0.24
Yearly Extra Return %	3.0	6.0

Source: Author's computation.

Based on the original regression, January provided an additional yearly return of 3% and September 6% (Table 9). If we take the last result into account, where only the September return is statistically significant and provides an extra yearly return, it more than compensates for transaction costs, averaging at 2% to 2.5% round trip.

From the above analysis, we can conclude that the January anomaly is quite minimal on the SEM. This result is interesting since in many stock markets, including developing markets, the January effect has been found to be pervasive and significant in both magnitude and statistical significance. Why is the Mauritius market different? Fountas and Segredakis (2002) find very little evidence in favour of this effect in the emerging stock markets. Similarly, Maghayereh (2003) finds no evidence of monthly seasonality or January effect in the Amman Stock Exchange. But more recent evidence points to a weakening of the January effect. For example, Roux and Smit (2001) find that seasonal anomalies disappear on the JSE, and Mlambo and Biekpe (2006) find no January anomaly for African stock markets (including Mauritius) they studied, except for Egypt and Zimbabwe.

We also observed a significant September effect. Many companies in the sample have their financial year end on June 30 and have three months after that to file their audited accounts with the Registrar of Companies. Many of them start to release their audited accounts in the press towards the end of August and in the first week of September. As discussed with the stockbrokers, this is the main reason for the September effect; it is like a “good news” earnings announcement. Another possible explanation is that tourist arrivals start to increase in this month following the onset of autumn/winter in Europe effect, the size and the value premium subsume most of the day-of-the-week effects.

Investigating the January effect and the month-of-the-year effect

Finally, the January effect was investigated within the Fama and French model framework. When we augmented the model by the January dummy, it was not significant for any of the portfolios. There was no January effect.

Table 12: Investigating month-of-the-year effect at portfolio level

Portfolios	const	EXCMKT	SMB	HML	SEPT	Adj. R^2
WSL	0.3278E-3	0.31967	0.37102	-0.32137	0.0026137	0.38483
	1.2440 [.214]'	6.2217 [.000]	19.5982 [.000]	-19.6875 [.000]	3.2720 [.001]	
WBH	0.3278E-3	.31967	-0.62898		0 . 5 8 8 6 3	
0.0026137	0.68443					
	1.2440 [.214]	6.2217 [.000]	-13.2236 [.000]	13.3251 [.000]	3.2720 [.001]	
	const	**EXCMKT**	**SMB**	**HML**	**DECEMBER**	**Adj. R^2**
WBL	0.9928E-3		0.19950	-0.53638	- 0 . 5 1 8 5 6	
-0.0026820	0.59368					
	2.3975 [.017]	2.9335 [.003]	-13.9054 [.000]	-13.1885 [.000]	-1.9527 [.051]	
WSH	0.9928E-3		0.19950	0.45834	0 . 4 7 5 4 6	
-0.0026820	0.56796					
	2.3975 [.017]	2.9335 [.003]	12.7891 [.000]	11.2473 [.000]	-1.9527 [.051]	

Source: Author's computation

This result confirms the earlier finding at company level and subsequently at market level where no January effect was found. Given our previous knowledge of a possible September effect, the model is augmented to incorporate this effect. The results are shown in Table 12. For two portfolios, WSL and WBH, we observed a September effect of 0.26% which was statistically significant at the 1% level. This will provide an extra yearly return of 5.2%. A similar analysis revealed a negative and statistically significant December effect of 0.268% for portfolios WBL and WSH.

Investigation of momentum strategies on the Stock Exchange of Mauritius

Mean excess returns on momentum portfolios

We can see from Table 13 that the mean excess returns on the momentum portfolios (sorted based on return only, the general case), range from 0.80% (for the 6 months/12 months strategy) to 0.86% per month (for the 6 months/6 months strategy). Overall, there is not much difference in the mean excess returns whichever investment strategy is considered. However, the mean excess returns are statistically significant at the 1%

an extra return of 0.094%.

Analysing the day-of-the-week effect

Next the day-of-the-week effect was analysed within the Fama and French three-factor model framework. The standard Fama and French three-factor model is augmented to investigate the day-of-the-week effect. The results are shown in Tables 11A and 11B. Two portfolios, WBH and WSL, had a positive and statistically significant Friday effect, with an extra return on Fridays of about 0.11%. The market factor and the size and book-to-market equity factors also remained significant at the 1% level. There was no day-of-the-week effect for the other two portfolios.

Table 11A: Investigating day-of-the-week effect at portfolio level

Dependent variable is WBH

Regressor	Coefficient	T-Ratio[Prob]
EXCESEMDEX	0.32722	6.3357[.000]
SMB	-0.63211	-13.2847[.000]
HML	0.58191	13.4171[.000]
MON	0.4939E-3	1.1508[.250]
TUES	0.5333E-4	0.12450[.901]
WED	0.5907E-3	1.3768[.169]
THURS	0.4314E-3	0.99889[.318]
FRI	0.0010711	2.5191[.012]
R-Bar-Squared 0.70190		
DW-statistic 2.0037		

Table 11B: Investigating day-of-the-week effect at portfolio level

Dependent variable is WSL

Regressor	Coefficient	T-Ratio[Prob]
EXCESEMDEX	0.32722	6.3357[.000]
SMB	0.36789	19.3716[.000]
HML	-0.32809	-19.4653[.000]
MON	0.4939E-3	1.1508[.250]
TUES	0.5333E-4	0.12450[.901]
WED	0.5907E-3	1.3768[.169]
THURS	0.4314E-3	0.99889[.318]
FRI	0.0010711	2.5191[.012]
R-Bar-Squared 0.37783		
DW-statistic 2.0000		

Source: Author's computation

We can deduce that the Fama and French three-factor model is quite robust to the day-of-the-week anomaly. When the market index alone was analysed, it will be recalled that returns on Monday, Wednesday, Thursday and Friday were found to be statistically significant. In an augmented model, which takes into account the size effect and the value premium, except for two portfolios, the day-of-the-week effect disappears. In fact, for two portfolios (WBH and WSL), only the Friday effect is statistically significant, providing an extra return of 5.14% on an annual basis. We can conclude that except for the Friday

12 months/12 months and 12 months/6 months). They were also all statistically significant at the 1% level. The next highest were those based on high book equity to market equity ranging from 0.51% to 0.54%.

We also observed that those based on low book equity to market equity also earned excess returns on the momentum portfolios but much lower in magnitude, around 0.28% per month, irrespective of the investment strategy considered. They were also statistically significant at the 1% level.

Within the big market capitalization portfolios, the mean excess return was negative and statistically significant for all the strategies considered. In other words, momentum portfolio BP1 was doing better than momentum portfolio BP3 within the large market capitalization stratification. This may not be surprising at all, given what we know about the size effect, that portfolios with small market capitalization tend on average to outperform portfolios with large market capitalization.

So far all this is in accordance with the literature on momentum, on size and on the value premium effects. Indeed, the size and the BE/ME effects have been found in previous research to be present on the Stock Exchange of Mauritius (for example, see Bundoo, 2006). These momentum patterns represent potential exploitable opportunities for investors.

But it remains to be investigated whether when taken within an asset pricing model, these momentum effects (momentum portfolios) remain statistically significant or disappear.

Therefore, overall we found strong momentum profits for the small market cap portfolios as well as the high BE/ME portfolios and moderate momentum profits on the low BE/ME portfolios. We therefore found momentum is positive and pervasive. It shows up in stocks and many types of portfolios.

Momentum portfolios sorted by return only within asset pricing models

When we regressed the momentum portfolios on the standard Fama and French factors, we found that for the winners' portfolio (P3), all the three factors were significant, at least at the 5% level, and the adjusted R^2 was around 54.15% (Table 15). For the loser portfolios, only the market factor and the size factor are significant, with the adjusted R^2 around 50.80%.

We then augmented the standard Fama and French three-factor model to consider whether the momentum factor was priced (the Carhart (1997) model). The results are reported in Table 16. For the winners' portfolio (P3), we found that all factors were statistically significant at the 1% level, including the momentum factor (UMD). The adjusted R^2 jumped to 84.25%. For the losers' portfolio (P1) all the four factors were also significant; the momentum factor (UMD) had a negative sign as expected. The adjusted R^2 climbed to 62.73%.

When we compared the coefficient for the UMD factor in relation to the other factors (market, size and value premium), the momentum factor dominated all of them; this shows that it explains more of the variation in the portfolio returns compared with the other factors.

level. They all indicate very strong significance.

Table 13: Mean excess returns for momentum portfolios sorted on return only

P3 less P1				
Strategy	**6/6 months**	**6/12 months**	**12/12 months**	**12/6 months**
Mean	0.863836	0.801764	0.836129	0.808422
Std. dev.	0.065201	0.017361	0.054979	0.023589
t-ratio	13.24892	46.18088	15.20803	34.27087

Source: Author's computation.

The mean excess returns on the momentum portfolios sorted by size and book equity to market equity are given in Table 14. The mean excess returns were quite high for all momentum portfolios except those based on big market capitalization. From Table 14 we observe that the mean excess returns for the momentum portfolios are statistically significant at the 1% level whether we consider the 6 months/6 months strategy, 6 months/12 months, 12 months/12 months and 12 months/6 months investment strategies.

Table 14: Mean excess returns on momentum portfolios sorted by size and book equity to market equity

Small market cap stocks				
SP3 less SP1	**6/6 months**	**6/12 months**	**12/12 months**	**12/6 months**
Mean	0.726155	0.790388	0.777903	0.82965
Std. dev.	0.039771	0.075792	0.06561	0.038235
t-ratio	18.2582	10.42836	11.85639	21.69887
Large market cap stocks				
BP3 less BP1				
Mean	-0.14951	-0.09582	-0.13185	-0.11418
Std. dev.	0.017364	0.03505	0.031478	0.033602
t-ratio	-8.61041	-2.73397	-4.18854	-3.39794
High BE/ME stocks				
HP3 less HP1				
Mean	0.527203	0.514916	0.53297	0.538737
Std. dev.	0.026611	0.053182	0.04242	0.05631
t-ratio	19.81173	9.682155	12.56418	9.567324
Low BE/ME stocks				
LP3 less LP1				
Mean	0.276834	0.27134	0.280485	0.284136
Std. dev.	0.007929	0.025756	0.014159	0.018605
t-ratio	34.91221	10.5349	19.81027	15.27169

Source: Author's computation.

The mean monthly return on the momentum portfolios were quite large, ranging from 0.83% per month for the 12 months/6 months strategy for the momentum portfolio based on small market capitalization (SP3 less SP1) to 0.54% per month for portfolios based on the high book equity to market equity category (HP3 less HP1).

The highest momentum excess returns were earned by the small market capitalization portfolios for all the four strategies considered (6 months/6 months, 6 months/12 months,

Table 17: Investigating momentum effects on the SEM in low book equity to market equity portfolios

Model: $(R_p t)$ - Rf = $\alpha_p t + ß_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + m_p(UMD) + \varepsilon_p t$						
	Const	**EXCMKT**	**SMB**	**HML**	**UMD**	**Adj.R^2**
LP3	-0.0032999	0.69025	0.13645	-0.14807	0.52544	0.82771
t-ratio (p-value)	-1.4448 [0.155]	11.1828 [0.000]	2.5841 [0.013]	-2.9196 [.005]	9.8328 [0.000]	
LP1	-0.0032999	0.69025	0.13645	-0.14807	-0.47456	
t-ratio (p- value)	-1.4448 [0.155]	11.1828 [0.000]	2.5841 [0.013]	-2.9196 [.005]	-8.8805 [0.000]	0.80482

Source: Author's computation.

Table 18: Investigating momentum effects on the SEM in high book equity to market equity portfolios

Model: $(R_p t)$ - Rf = $\alpha_p t + ß_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + m_p(UMD) + \varepsilon_p t$						
	Const	**EXCMKT**	**SMB**	**HML**	**UMD**	**Adj.R^2**
HP3	0.010277	0.47397	0.13868	0.33641	0.58747	0.76529
t-ratio (p-value)	4.2582 [0.000]	4.8893 [0.000]	1.9955 [0.052]	4.9079 [0.000]	7.0039 [0.000]	
HP1	0.010277	0.47397	0.13868	0.33641	-0.41253	0.62489
t-ratio (p- value)	3.3436 [0.002]	5.6502 [0.000]	1.9955 [0.052]	4.9079 [0.000]	-7.1611 [0.000]	

Source: Author's computation.

Momentum portfolios sorted based on market capitalization

When we come to the portfolios sorted by size, for the small market cap portfolios we found the signs as expected and all the factors were statistically significant at the 5% level or better. The momentum factor loaded positively for the winners' and negatively for the losers' portfolios. The adjusted R^2 were 82.8% and 80.5% respectively. This can be seen in Table 19.

Table 19: Investigating momentum effects on the SEM in small market cap portfolios

Model: $(R_p t)$ - Rf = $\alpha_p t + ß_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + m_p(UMD) + \varepsilon_p t$						
	Const	**EXCMKT**	**SMB**	**HML**	**UMD**	**AdjR^2**
SP3	-0.0032999	0.69025	0.13645	-0.14807	0.52544	0.82771
t-ratio (p-value)	-1.4448 [0.155]	11.1828 [0.000]	2.5841 [0.013]	-2.9196 [0.005]	9.8328 [0.000]	
SP1 0.80482	-0.0032999	0.69025	0.13645	-0.14807	-0.47456	
t-ratio (p-value)	-1.4448 [0.155]	11.1828 [0.000]	2.5841 [0.013]	-2.9196 [0.005]	-8.8805 [0.000]	

Source: Author's computation.

Table 15: Momentum portfolios sorted by return only regressed on the Fama and French factors

Model: $(R_p t) - Rf = \alpha_p t + ß_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + \varepsilon_p t$

	Const	EXCMKT	SMB	HML	Adj. R^2
P3	0.0056070	1.1380	0.77676	0.66212	0.54147
t-ratio (p-value)	0.86870 [.389]	6.4438 [0.000]	5.2936 [0.000]	4.5633 [0.000]	
P1	-0.0032294	0.59229	0.23921	0.085877	0.50803
t-ratio (p- value)	-1.150 [.255]	7.1471 [.000]	3.6329 [0.001]	1.3506 [0.183]	

Source: Author's computation.

Table 16: Testing momentum effects on the Stock Exchange of Mauritius using the Carhart (1997) model

Model: $(R_p t) - Rf = \pm_p t + ß_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + m_p(UMD) + \mu_p t$

	Const	EXCMKT	SMB	HML	UMD
P3	-0.0016807	0.69882	0.35171	0.19133	0.81015
t-ratio (p-value)	-0.72457 [0.472]	10.4569 [0.000]	6.1986 [0.000]	3.3424 [0.002]	18.6918 [0.000]
				Adj.R^2	.84245
P1	-0.0022308	0.71552	0.35279	0.18205	-0.18293
t-ratio (p- value)	-0.94418 [0.350]	9.0886 [0.000]	5.6789 [0.000]	2.9118 [0.005]	-3.7007 [0.001]
				Adj. R^2	0.62732

Source: Author's computation.

Momentum portfolios sorted based on book tquity to market equity

We find from Table 17 that for LP3 (the winners' portfolio), all the signs were in accordance with a priori expectations, with the market factor, the size factor, the value premium and the momentum factor all statistically significant at least at the 5% level or better. The adjusted R^2 was 82.77%. The same was observed for LP1 (the losers' portfolio). Given that they are low BE/ME portfolios, they load negatively on the HML factor as expected. The losers' portfolio also loads negatively with respect to the momentum factor.

Similarly, we found the momentum factor dominated the size and book equity to market equity factors in terms of explanatory power.

When we considered the signs for the winners' and losers' portfolios for the high book equity to market equity category, they were as expected and statistically significant at around the 5% level or better as shown in Table 18. The momentum factor was also statistically significant and loaded negatively for the losers' portfolio as expected. For the winners' portfolio the momentum factor was in fact strongest not only in terms of statistical significance but also in terms of economic significance. Again, we observe that the momentum factor showed higher explanatory power compared with the Fama and French factors.

Comparison of results based on the Fama and French Three-Factor model with the Carhart model

The momentum factor (UMD) was priced and statistically significant in all the models except for 'big market cap' portfolios. The momentum factor (UMD) was also greater in magnitude than the size factor (SMB) and the book equity to market equity factor (BE/ME). For some portfolios, the momentum factor dominated the market factor (EXCMKT). We also noted a significant increase in the explanatory power (adjusted R^2) of the models by including the momentum factor; it increased from a range of 50% to 55% in the standard Fama and French three-factor model to a range of 62% to 84% in the Carhart model. We therefore conclude that we cannot ignore the momentum factor as it represents valuable information to investors, both as a potential trading strategy and in asset pricing models.

Investigating momentum and seasonality effects

The results in Table 21 report the excess mean return by month for the momentum portfolios. Again the same pattern is confirmed. The momentum portfolios based on small market capitalization recorded the highest excess mean return, followed by the momentum portfolios based on high book equity to market equity and then the low book equity to market equity portfolios. The big market capitalization stocks recorded a negative mean excess return.

When the Carhart model was augmented by monthly dummies, none of the dummies were found to be statistically significant. Therefore no seasonality effects could be discerned.

Table 21: Excess mean return by month for the momentum portfolios

	Small Market	**Big Market**	**High BE/ME**	**Low BE/**
ME				
	Cap Stocks	**Cap Stocks**	**Stocks**	**Stocks**
Month	**SP3-SP1**	**BP3- BP1**	**HP3-HP1**	**LP3-LP1**
JAN	0.563933	-0.07597	0.440409	0.234557
FEB	0.490363	-0.09213	0.335824	0.180058
MAR	0.50842	-0.07842	0.344087	0.207707
APR	0.501696	-0.12131	0.331161	0.177242
MAY	0.516882	-0.15207	0.361447	0.157681
JUN	0.514094	-0.15581	0.322262	0.165486
JUL	0.468894	-0.12002	0.325611	0.172777
AUG	0.48606	-0.09384	0.348997	0.199755
SEP	0.500354	-0.08703	0.367682	0.228744
OCT	0.511849	-0.08737	0.384119	0.252616
NOV	0.545848	-0.08742	0.420435	0.243527
DEC	0.546688	-0.0818	0.413169	0.239389

Source: Author's computation.

Table 20: Investigating momentum effects on the SEM in big market cap portfolios

Model: $(R_p t) - Rf = \alpha_p t + \beta_p(Rmt - Rf) + s_p(SMB) + h_p(HML) + m_p(UMD) + \varepsilon_p t$

	Const	EXCMKT	SMB	HML	UMD	AdjR^2
BP3	0.0012653	0.91007	-0.072352	0.074635	0.64459	0.78728
t-ratio (p-value)	0.41124 [0.683]	10.2792 [0.000]	-1.0080 [0.318]	1.0903 [0.281]	1.6902 [0.091]	
BP1	0.0012653	0.91007	-0.072352	0.074635	-0.35541	0.80258
t-ratio (p- value)	0.45281 [0.653]	9.8856 [0.000]	-0.84387 [0.403]	1.0795 [0.286]	-2.5227 [0.015]	

Source: Author's computation.

For the big market cap portfolios in Table 20, all the signs were in accordance with a priori expectations. The momentum factor was not significant and positive for the winner portfolios (BP3) and significant and negative for the loser portfolios (BP1). The adjusted R^2 ranged from 78.7% to 80.3%.

per the Fama and French (1993) three-factor model are controlled for. The possible profit opportunities on the SEM in terms of both economic and statistical significance are also investigated. Finally, the study investigated investment strategies based on momentum in returns on the Stock Exchange of Mauritius and how robust these strategies were after controlling for size and value.

The main findings were:

(i) The highest daily return was observed on Wednesday, followed by Friday. Yet the CV for Wednesday was the lowest while that for Friday was the second lowest.

(ii) For the market return (the Semdex return), the effects for Wednesdays, Thursdays and Fridays were statistically positive and stronger.

(iii) We found a very minimal January effect both at market level and company level. In fact, further investigation revealed that we have a strong September effect on the Stock Exchange of Mauritius. This could be due to the fact that companies must file their audited financial statements in September as explained by the stockbrokers.

(iv) When analysed within the Fama and French three-factor model, we found that except for the Friday effect, the size and the value premium subsumed most of the day-of-the-week effects.

(v) When the January effect was investigated within the Fama and French model framework, it was not found to be significant for any of the portfolios considered. There was no January effect. Given our previous knowledge of a possible September effect, the model was augmented to incorporate this effect. For two portfolios, WSL and WBH, we observed a September effect which was statistically significant at the 1% level.

(vi) The mean excess returns on the momentum portfolios based on returns only were statistically significant at the 1% level. Overall, we also found strong momentum profits for the small market cap portfolios as well as the high BE/ME portfolios and moderate momentum profits on the low BE/ME portfolios. Those based on big market capitalization stocks did not show momentum profits.

(vii) When we considered the momentum portfolios as per the Carhart (1997) model, we found that in addition to the size effect and value premium, the momentum factor was also statistically significant and often also stronger in terms of economic significance than the market factor, the size factor or the book equity to market equity factor. There was also a sizeable increase in the explanatory power of the model when compared with the model with the Fama and French factors only.

(viii) We finally investigated whether the momentum effects were more pronounced in some months than others. Based on the regression results, no seasonality effects were observed when monthly dummies were added to the Carhart model.

5. Conclusion

The Stock Exchange of Mauritius started operations in July 1989 and by December 2006 there were 41 listed companies with a market capitalization of US$3,540.60 dollars. The market index is the Semdex and the exchange is regulated by the Financial Services Commission. This study investigated whether the stock market anomalies such as day-of-the-week effect and the January effect are present on the Stock Exchange of Mauritius over the period January 2004 to December 2006. It then analysed whether the calendar anomalies persist when the size effect and the value premium as

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