Momentum effect in stocks’ returns between the rational and the behavioural financial theories: Proposition of the progressive rationality

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Abstract

The puzzling momentum strategies’ payoffs are defying the rational financial theory asserting the stocks returns’ unpredictability. Moreover, the momentum effect persist the main stocks returns’ anomaly escaping any risk-based explanation. The resilience of this phenomenon had favoured the development of behavioural financial field, which breaks with the investor’ full rationality hypothesis. This paper attempts to reconcile between the rational and behavioural financial theories, through the introduction of the progressive rationality concept. Especially, we argue that recognizing the temporary inappropriate investors’ reactions; can resolve the puzzling momentum anomaly. To fulfil our objective, first we correct the monthly returns inherent to 56 stocks listed on the Tunisian stocks market from January 1998 to December 2011, from the related serial autocorrelations involved by the investors’ over and under reactions. Then, we examine the 6/6 momentum strategy’ excess returns before and after the monthly returns serial autocorrelations’ corrections. The result show that the momentum strategy is still profitable but no longer puzzling, since the related excess return is henceforth fully captured by a β and a size effect.

Key words: Tunisian momentum effect; the rational finance theory; the behavioural finance theory; the three-factorial model and the autoregressive process.

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1. Introduction

The momentum effect in stocks’ returns is a medium term regular stocks’ prices trend, that was notified by practitioners, by financial analyst and also it was documented by almost all academic studies whenever and wherever it is explored. Such regular continuation stocks’ trend involves the opportunity to make certain profits (risk free) through the bought of past winner stocks and the sale of the past losers. Moreover, this medium term continuation tendency of the monthly stocks’ returns seems to be resilient and not connected to a particular period or to particular sample. Even, after considering the transaction costs, the momentum strategies continue to provide significant and positive yields, Jegadeesh and Titman (1993), Korajczyk and Sadka (2004). A so persistent finding raised the researcher’s interest to explore the origins of such sure and profitable strategies. Nevertheless we distinguish two opposed research fields that are rational and behavioural fields.

a Grinblatt and Titman (1989, 1991) find that the majority of the mutual funds in their study sample show a tendency to buy stocks that have increased in price over the previous quarter. Also Grinblatt, Titman, and Wermers (1994) show that about 77% of the 155 mutual funds in their sample follow momentum strategies.

In the first field, we find researches that are trying to preserve the full investor rationality and the market efficiency hypothesis. Especially they are trying to uncover some hidden risk to justify the profitability of the momentum strategies. The second field includes academicians who rely on the psychologists’ experimental results and reject the hypothesis of the investors’ full rationality. They find that this hypothesis is very simplistic and too far away from the human reality, so they call to break with this assumption and to recognise that investors are humans and their behaviour is naturally subject to some psychological and cognitive biases.

That is the investors are enabling to react properly to information, so they either under react or over react to any new information.

These latest argument seem to be more plausible, especially when the rational academicians recognise the anomaly of the momentum effect to the CAPM and to the three-factorial model, Fama and French (1996). Especially, the literature could not associate the momentum strategy to an underlying conventional risk, in order to explain its puzzling profitability. Moreover, the research of new nature of risks that we could associate to the momentum strategy was not conclusive. Especially, they lack to theoretical support to be sufficiently plausible.

In this paper, we try to reconcile between these two theories, especially we try to explore to what extent we can talk about a progressive rationality. That is the investor who we suppose initially irrational gradually learns how to find his full rationality. Especially, we argue that it’s about time to recognize the natural investors irrationality and to consider the under and over reactions induced by the inappropriate investors’ reactions to news.

Nevertheless and unlike the previous behavioural studies that are trying to identify the psychological or the cognitive biases that may support a theoretical framework involving medium term momentum effect in stocks’ returns, in this paper we propose, rather to adjust the stocks’ returns from any serial autocorrelation, regardless of the responsible bias’ nature. To fulfil our objective we propose to introduce an appropriate autoregressive process, and then we re-implement the momentum strategy on the serial autocorrelation adjusted stocks’ returns. The results show that the adjusted momentum strategies’ pay offs are no longer anomalous to the three-factorial model. Especially, the 6/6 adjusted momentum strategy returns are henceforth fully captured by a β and a size effects. The rest of the paper is organised as follows: section 2 is reserved to a review the rational and the behavioural literatures developed in regard of the momentum effect. Section 3 documents the presence of the momentum effect in the Tunisian monthly stocks’ returns. Section 4 examines the momentum strategy’ excess returns after correcting the monthly stocks returns from the inherent serial autocorrelations. Section 5 concludes the paper.

2. Explication of the momentum effect in the monthly stocks’ returns: a literature overview

As we said earlier, the exploration of the momentum effect was led by two schools of thoughts i.e. the rational school and the behavioural one. In two successive paragraphs, we try to synthesize the main thesis advanced in each school.

2.1 overview of the rational literature: risk-related explanations

The adherents to this literature are trying to explain the momentum effect whilst preserving the full rationality hypothesis. In this regard we find the study of Conrad and Kaull (1998), in which the two authors argue that the momentum effect is a natural consequence of the stationary nature of the cross-sectional variations in the stocks’ average returns. Berk, Green and Naik (1998) connect the momentum effect to the natural temporary persistence of the systematic risk of each firm. This persistence in the systematic risk level will be traduced by a continuation in the stocks’ returns tendency. Also, Chen (2003) connects the momentum profits to the importance of slow evolution of changes in firm characteristics. Especially, the lifecycle of investment styles can thus have predictive power for trend-chasing investors, who can potentially push up the price of stocks with an in-favour style, and depress the price of stocks with an out-of-favour style.

But this thesis was rapidly criticized especially by Jegadeesh and Titman (2001) who argue that such argument suppose an eternal momentum effect, but in reality we usually document a trend reversal after about 12 months. Other researchers try instead to revise the explanatory variables in the stocks’ returns model evaluation especially they review the CAPM and the three-factorial model of Fama and French (1993). For example Karoly and Kho (1996) and Wu (2001) introduce an economical conditional approach respectively to the above two evaluation models. It’s true
that with these econometric revisions the momentum is no longer an anomaly; nevertheless such results should be considered with reserve since there is no theoretical support for such revisions. Especially, Griffen, Ji and Martin (2002) argue that connecting the momentum in stocks’ prices to some macro-economic risk is meaningless. Also Anatonios, Lam and Paudyal (2007) argue that momentum effect is unexplained by conditional asset pricing, but they are convinced that the momentum effect is related to risk factors, which are undetected thus far and are largely attributable to the business cycle.

As conclusion, there is no study that arrives to explain the momentum effect under the respect of the full rationality. In this regard Fama and French (1996, 1998) affirm that the momentum effect persist the main anomaly to their model that arrives to capture all the other documented anomalies in stocks’ returns paths.

2.2 overview of the behavioural literature

In the late of 1990 and after the failure of the conventional model to find a rational explanation for the momentum effect, many academicians are motivated to revise the full rationality and to extrapolate the results of the experimental studies lead carried by the psychologists. Especially Oskamp (1965) and Edward (1968) assert that humans behaviours is far from the full rationality and such hypothesis is enough simplistic and implausible. For the purpose of this thesis, the most essential implication of behavioural finance is the fact that irrationality can lead to market inefficiency, whereby assets do not necessarily carry their fundamental value or follow a random walk, as believed in the traditional finance theory.

Especially the psychologists precise that the deviation from rationality appears in two forms: first the human mind is unable to consider all the available data. Second the humans conduct a subjective treatment of data (they deviate from the Bayes probability distribution). Nevertheless, and whatever the irrationality form, it will be traduced into under or over reaction. Interested with the first irrationality form, Hong and Stein (1999) develop a model in which they suppose the existence of two types of investors. The first type considers only the new evidence but the second considers only the past securities’ prices paths. The authors argue that the partial information consideration lead to under reaction so the birth of a continuation trend in the monthly stocks’ returns. Instead Daniel, Hirshleifer and Subrahmanyam (DHS 1997) and Barberis, Shleifer and Vishney (BSV 1997) were interested with the second irrationality form i.e. the subjective treatment of information under the effect of some cognitive bias.

DHS (1997) rely on the overconfidence and the self attribution biases. Especially they suppose that the insiders are overconfident and over react to the private information. Then gradually and as the private information becomes public, prices will be adjusted. So prices seem overreact to public information. This temporary overreaction will be traduced by the momentum effect. Then begin the prices adjustment which will be traduced in a contrarian path. Also, Cooper, Gutierrez and Hameed (2004), Husang (2006) connect the momentum effect to the investors’ overconfidence to news during bull market. Their conclusion is based on the finding asserting that momentum effect is positive during bull markets and negative during bear markets. Instead BSV (1997) used the conservatism and the representativeness biases to explain the momentum effect. Especially they suppose that investors tend to underestimate the new evidence and to overestimate the importance of the past evidence. That is they under react to news. The under reaction will be traduced by a positive serial returns correlations or a momentum effect.

As conclusion the behavioural financial researches argue that investors never respond properly to evidence. Especially, we notice a common approach to the all previous behavioural studies. This approach consists in selecting the appropriate psychological or cognitive biases that may support a theoretical framework able to involve a medium term momentum effect in stocks’ returns.

3. Momentum effect in the Tunisian stocks’ returns: methodology and results

It’s true that in an earlier paper (zoghlami 2011), the momentum effect on the Tunisian stocks’ returns was already identified, over the 16 medium horizons terms, but here, and as did Jegadeesh and Titman (2001)§ and Chan, § Jegadeesh and Titman (2001) extended their earlier (1993) sample period with eight years.
Jegadeesh, and Lakonishok (1999)\(^4\), we extend our sample period with additional seven years. Thus our sample period is from January 1998 to December 2011. The purpose of this extension is to see whether our previous study’ findings hold outside the initially selected sample period.

Our data are composed of the monthly returns of the 56 stocks listed on the main market. We don’t exclude any stock. Moreover, we begin with 50 stocks and as we document the entry of a new stock, we introduce it in our sample.

3.1 Methodology

To test the presence of the momentum effect over the Tunisian stocks’ returns and as we did earlier, we adopt Jegadeesh and Titman (1993), since they are the authors of the pioneering academic work on momentum strategies. We should notice that this methodology is commonly used by almost all studies dealing with momentum effect\(^5\).

The methodology consists to explore the profitability of momentum strategies that involve investing on the basis of historical stock prices. Specifically, it is suggested that if recent trends in stock prices are maintained into the near future, then an investment approach that buys stocks that have realized high returns in recent times and short-sells stocks that have realized poor returns will outperform the market.

In the following, we describe briefly the used methodology: At the beginning of each month, stocks are ranked in ascending order on the basis of their returns in the past / months, where \(J\) is the formation period usually set to 3, 6, 9, or 12 months. Based on these rankings, stocks are divided into five quintiles\(^6\) portfolios. The portfolio containing the stocks with the highest past returns is called the winner portfolio, whereas the portfolio containing the stocks with the lowest past returns is called the loser portfolio. The stocks in the portfolios are, and as in the majority of the studies, equally-weighted at the formation date.

In each month \(t\), the ex- \(J\) months winner ‘portfolio is bought and held for \(K\) months, where \(K\) is the holding period; again usually set to 3, 6, 9, or 12 months. In addition, the position initiated in month \(t\)- \(K\) is closed out. Thus in any given month, the strategies hold a series of portfolios selected in the current month as well as in the previous \(K\)-1 months. The monthly return for \(K\)-months holding period is calculated as an equally-weighted\(^6\) average of portfolio returns in the current month and in the previous \(K\)-1 months. At the end of the sample period, the momentum return for a given strategy is calculated as the average monthly return of the winner portfolio minus the average monthly return of the loser portfolio over the sample period.

The momentum return that we consider is the return of the zero-cost portfolio, since a strategy that short-sells the loser portfolio and buys the winner portfolio for the proceeds is, when disregarding transaction costs, approximately free of costs to the investor. Obviously, the momentum strategy has proven profitable, whenever the momentum return, or the return of the zero-cost portfolio, turns out to be positive and statistically significant.

The above method using four different formations periods and four different holding periods, sums up to a total of 16 momentum strategies\(^7\).

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\(^4\) These researchers extended their earlier (1996) sample period with five years.

\(^5\) We should notice that some researchers such as Conrad and Kaull (1998) used the weighted relative strength strategy (WRSS).

\(^6\) We should precise that Jegadeesh and Titman (1993) distinguished ten deciles, but in our previous and present study and since the reduced number of stocks, we distinguish only five quintiles.

\(^7\) Since using value-weighted portfolios makes it more difficult to conclude, whether momentum is present in all types of stocks or in large stocks only.

\(^8\) We precise that in our earlier work, we carry the 16 momentum strategies with and without skipping a month between the formation and the holding period in order to avoid bid-ask spreads and short term reversal effects, as documented by Jegadeesh (1990) and Lehman (1990). But in the present study we don’t skip any lag time between the formation and the holding period, since the obtained results are not significant.
3.2 Results

Table 1 gives the results of the J months /K months momentum strategies’ yields. The momentum strategy consists in buying the past J months winners and selling the past J months losers, and to hold this position during the K next months. If this strategy’s returns is significantly positive that it translates that the past J months winner stocks continue to outperform the past J months losers, during the next K months.

<table>
<thead>
<tr>
<th>Holding periods</th>
<th>Formation periods</th>
<th>J = 3</th>
<th>J = 6</th>
<th>J = 9</th>
<th>J = 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>K = 3</td>
<td>$R_w - R_l$</td>
<td>1.98%</td>
<td>2.16%</td>
<td>2.54%</td>
<td>2.88%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(3.04)</td>
<td>(3.38)</td>
<td>(3.84)</td>
<td>(4.01)</td>
</tr>
<tr>
<td>K = 6</td>
<td>$R_w - R_l$</td>
<td>1.59%</td>
<td>1.91%</td>
<td>2.06%</td>
<td>2.58%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.56)</td>
<td>(2.96)</td>
<td>(3.05)</td>
<td>(3.85)</td>
</tr>
<tr>
<td>K = 9</td>
<td>$R_w - R_l$</td>
<td>1.07%</td>
<td>1.64%</td>
<td>1.61%</td>
<td>1.89%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(1.95)</td>
<td>(2.09)</td>
<td>(2.08)</td>
<td>(2.37)</td>
</tr>
<tr>
<td>K = 12</td>
<td>$R_w - R_l$</td>
<td>1.55%</td>
<td>1.41%</td>
<td>0.89%</td>
<td>0.84%</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(2.56)</td>
<td>(2.01)</td>
<td>(1.92)</td>
<td>(1.41)</td>
</tr>
</tbody>
</table>

Again and according to table 1, the results document that the momentum effect on the Tunisian stock market in the period from January 1998 to December 2011, in that the returns of all 16 momentum strategies are positive. Moreover, except the 12/12 strategy, all the other 15 momentum strategies yield positive and significant returns. Nevertheless, we notice a decrease in the all momentum strategies compared to our prior study (Zoghlassi, 2011). This finding may be related to the revolution and political turmoil that has known Tunisia and that are continuing to negatively affect the stock market.

Strategies earn a positive return and all momentum returns are statistically significant at least at the 5% level. The most profitable strategy is the 12-month/3-month strategy which yields 2.88%, significant at the 1% level. The strategy with the worst performance is the 12-month/12-month strategy with an average monthly return of 0.84%, being statistically significant at the 10% level. The general finding from the above table seems to be that strategies with long formation periods and short holding periods perform better than the remaining strategies. Noteworthy, this is exactly the same conclusion reached by Jegadeesh and Titman (1993) and Lee and Swaminathan (2000) in investigating the American market and by Rouwenhorst (1998) in investigating the European market. More broadly, and consistent with the finding by Bird and Whitaker (2003), it can be said that strategies with short holding periods tend to outperform strategies with long holding periods, regardless of the length of the formation period.

Looking at the returns given in table 1, it becomes clear that the success of the momentum strategies comes from both buying the winner portfolios and short-selling the loser portfolios. To have invested in the winner portfolios alone would not have been an attractive alternative, since the strategy, by far, outperforms the winner portfolio in each of the 16 strategies. Henceforth, we will focus on the 6/6 momentum strategy to carry our tests. This choice is only duplication of the previous studies (Jegadeesh and Titman (1993) and (2001), Fama and French (1996) and (1998)).

3.3. Rational explanation attempt: explanation of the 6/6 momentum portfolio’ returns using the three-factorial model

After documenting the significant positive returns yielded by the 16 momentum portfolios, we try to explain this positive returns using risk based explanation. That is we attempt to examine to what extent the momentum portfolios

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1 It passes from an average of 2.52% per month to an average of 1.78%.
returns translate the market remuneration against some conventional risks that may be associated with the strategies. If it is the case, then the momentum strategy returns will be acceptable in the rational finance framework. We use the three-factorial model developed by Fama and French (1993). The model explains the stock excess’ return as market remuneration against its underlying β, the size effect and the market devaluation effect. Nevertheless, Fama and French (1996) recognise that their model that succeed to capture all the CAPM’ anomalies, fails to explain the momentum portfolios’ returns. i.e this strategy seems to yield risk free returns, which is anomalous to any efficient and rational financial theory.  

Fama and French (1993) argue that not only beta (as assumed in the CAPM) but also size and book-to-market values should be considered proxies for risk: (i) the size effect: according to Fama and French (1993), the market remunerates the small stocks (i.e. small market capitalisation) because they are considered riskier than the large ones. This market premium is measured by the difference between the small stocks’ returns and the large stocks ones (SMB), (ii) the devaluation effect: also the researchers suppose that the market remunerates the devaluated stocks. This premium is measured by the difference between the high book to market ratio stocks and the low book to market ratio stocks (HML). So, the three-factorial model as presented by Fama and French (1993) is:

\[ E(r_i) = \alpha + \beta_i (E(r_m) - r_f) + s_i E(SMB) + h_i E(HML) \]

where: \( E(r_i) \) = the expected return of stock i; \( r_f \) = the risk free rate; \( E(r_m) \) = the expected return of the market portfolio; \( E(SMB) \) = the expected difference in the return of a portfolio of small stocks and a portfolio of large stocks (small minus big); \( E(HML) \) = the expected difference in the return of a portfolio of high book-to-market stocks and a portfolio of low book-to-market stocks (high minus low); \( \beta_i \), \( s_i \) and \( h_i \) = the sensitivity of stock i’s return to the return of the market portfolio, the size factor and the book-to-market factor, respectively.

In this paper, we focus on the 6/6 momentum portfolio returns. That is we try to explain the significant positive returns yielded by the strategy that consists in buying the ex 6 months winners and selling the ex 6 months losers and then to hold this position during the next 6 months. Especially we estimate the following model:

\[ R_{moment} - R_0 = \alpha + \beta (R_{mt} - R_f) + s SMB + h HML + c_0 \]

Table 2: The three-factorial model estimation

<table>
<thead>
<tr>
<th>Exogenous variable</th>
<th>( \alpha )</th>
<th>( \beta )</th>
<th>( s )</th>
<th>( h )</th>
<th>( R^2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( R_{moment} - R_0 )</td>
<td>0.15</td>
<td>0.03</td>
<td>-0.28</td>
<td>0.33</td>
<td>0.58</td>
</tr>
<tr>
<td></td>
<td>(2.22)</td>
<td>(0.98)</td>
<td>(-3.85)</td>
<td>(4.2)</td>
<td></td>
</tr>
</tbody>
</table>

To obtain the monthly SMB returns, at the beginning of each year, we classify the stocks according to their market capitalisation, and then we split the sample into three groups. The first group includes the smallest and the third group includes the biggest. After, we consider the difference between the average monthly return of the two groups. Equally to construct the HM’ returns, at the beginning of each year, we classify the stocks according to their book to market ratios. Then the sample is split into three groups. After, we consider the difference between the monthly average returns of the first and the third group. About the market return we consider the monthly return of BVMT, as it includes all the listed stocks.

The results given in table 2 are revealing. Especially and differently to the occidental momentum strategies’ returns that could not be connected to any one of these three risk premiums, the Tunisian momentum effect seems to find

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1 We should notice that these finding are inherent to American stocks’ markets, nevertheless there were confirmed in many other European and American stocks’ markets.
some significant explanation in the size effect. That is the momentum strategies may be profitable, since the winner stocks seem to be the smallest, so the market continue to remunerate them in exchange to their little size\(^6\). Again, we confirm our earlier findings even with a larger sample, i.e. the Tunisian momentum strategy seems to offer insurance against the book to market effect, since it consists in buying the ex-winners which are well valued and in selling the ex-losers which are devalued. (Zoghlami, 2011). Although that the size effect reaches to explain the Tunisian momentum strategy’ returns, the constant remains significantly positive. Thus there is a significant part of the momentum portfolio returns, still defies the model. Such finding attests moreover the anomalous profitability of the momentum strategies to any rational modelling which is exclusively based on risk explanation.

These results motivate us to consider the predictions of the behavioural financial and to consider the investor irrationality. Especially, we try to adjust the stocks’ returns from these behavioural biases which are translated into over and under reactions to news.

4. Momentum strategy’ excess returns after correcting the monthly stocks’ returns from the related serial autocorrelations

Sharing the psychologists’ argument, we try in this paper to recognize to some limits the investor irrationality. That is and contrary to the financial behavioural theories which break totally with the rationality hypothesis, we attempt to introduce the progressive rationality according to which, investors learn progressively to react appropriately to information and this after some under and over reactions. So, we argue that it’s sufficient to adjust returns from the bias introduced by the investors’ irrational behaviour; that the rational financial theories find their validity and soundness. Especially, we proceed in two steps, first we test the presence of partial autocorrelation among monthly stocks’ returns using the Ljung and Box Q statistic, and then we consider the adjusted returns series.

4.1 test of presence and the order of the partial autocorrelation

To test the presence of some significant partial autocorrelation, we draw the Ljung and Box Q statistic for 10 lagged level of the monthly stocks’ returns.

<table>
<thead>
<tr>
<th>Lagged level</th>
<th>AC</th>
<th>Q</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>-0.116</td>
<td>1.65</td>
</tr>
<tr>
<td>2</td>
<td>0.308</td>
<td>10.23**</td>
</tr>
<tr>
<td>3</td>
<td>0.254</td>
<td>11.64**</td>
</tr>
<tr>
<td>4</td>
<td>0.221</td>
<td>10.35*</td>
</tr>
<tr>
<td>5</td>
<td>0.197</td>
<td>11.24*</td>
</tr>
<tr>
<td>6</td>
<td>0.136</td>
<td>9.25</td>
</tr>
<tr>
<td>7</td>
<td>0.106</td>
<td>8.73</td>
</tr>
<tr>
<td>8</td>
<td>0.093</td>
<td>7.85</td>
</tr>
<tr>
<td>9</td>
<td>0.081</td>
<td>7.70</td>
</tr>
<tr>
<td>10</td>
<td>0.052</td>
<td>7.43</td>
</tr>
</tbody>
</table>

**significant at level 1% *significant at level 5%

Table 3 asserts the presence of an autocorrelation process among the stocks’ monthly returns series. At the first lag level, we find a negative autocorrelation which may predict the short term contrarian effect documented by Debondlt and Thaler (1985). But from the second lag level to the fifth one, we find a positive and significant partial autocorrelation. Such test predicts, that the return of stock \(i\) at month \(t\), remains influenced by the five ex-months returns. So, we can conclude from this study, that the Tunisian investors take on average five months to carry out an appropriate interpretation. Moreover, this study seems to promote the under reaction theory based on the bias of

\(^6\) This result was confirmed in an earlier paper that we published in 2010. In which we explore the size and the book to market characteristics of the winners and of the loser stocks.
conservatism and the investor limited capacity to compute instantly the whole information. To adjust returns from these biases, we consider the residual returns of the following estimation which introduces an autoregressive process to explain the stocks’ returns:

\[ R_{it} = a R_{it-1} + b R_{it-2} + c R_{it-3} + d R_{it-4} + e R_{it-5} + \xi_{it} \]

Results that are given in table 4, confirm our above conclusions. Especially except the first coefficient which is negative but not significant, all the four coefficients are significantly positives.

Table 4: Estimation of the autoregressive process (5)

<table>
<thead>
<tr>
<th></th>
<th>a</th>
<th>b</th>
<th>c</th>
<th>d</th>
<th>e</th>
</tr>
</thead>
<tbody>
<tr>
<td>R</td>
<td>-0.0015</td>
<td>(1.23)</td>
<td>0.223</td>
<td>(2.1)</td>
<td>0.195</td>
</tr>
</tbody>
</table>

Here we carry the estimation of the following model \( R_{it} = a R_{it-1} + b R_{it-2} + c R_{it-3} + d R_{it-4} + e R_{it-5} + \xi_{it} \), in order to obtain returns free of any significant autocorrelations involved by the temporary irrational investors’ behaviours. Then we consider the residuals that are the returns adjusted from the autocorrelations, i.e. from the under and over reactions. The adjusted returns is noted \( AR_{it} \).

\[ R_{it} - R_{it} = AR_{it} \]

Where \( R_{it} \) = the computed returns using the estimated coefficients. Finally, we recalculate the profitability of 16 momentum strategies using the above adjusted returns.

4.2 The adjusted momentum strategies’ returns

Now, we use the same detection methodology explained in section 2, but instead of the use of the monthly stocks returns, we use the adjusted returns to identify the winner and the loser stocks among the ex J months and then to hold them during the K next months. As shown in table 5, the 16 adjusted momentum strategies yield henceforth positive and negative which are sometimes significant and other times not significant. So applying momentum strategy on adjusted returns seems to rub away its significant robust profits. Moreover, we don’t identify any regular evolution of the momentum strategies returns, as K or J become longer. Also, we remark a significant decrease in the profitability level. We can so conclude that significant part of the momentum strategies’ returns become from the serial autocorrelations among stocks’ returns.

Table 5: The adjusted momentum strategies’ returns

<table>
<thead>
<tr>
<th>Holding periods Formation periods</th>
<th>J = 3</th>
<th>J = 6</th>
<th>J = 9</th>
<th>J = 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>K = 3</td>
<td>( R_{w} - R_{l} )</td>
<td>-0.06%</td>
<td>0.36%</td>
<td>0.54%</td>
</tr>
<tr>
<td>K = 6</td>
<td>( R_{w} - R_{l} )</td>
<td>0.21%</td>
<td>0.38%</td>
<td>0.41%</td>
</tr>
<tr>
<td>K = 9</td>
<td>( R_{w} - R_{l} )</td>
<td>-0.09%</td>
<td>-0.05%</td>
<td>0.11%</td>
</tr>
<tr>
<td>K = 12</td>
<td>( R_{w} - R_{l} )</td>
<td>-0.05%</td>
<td>-0.012%</td>
<td>-0.03%</td>
</tr>
</tbody>
</table>

No one of the above returns reaches significance even at the 10% level

So, when we consider the irrational behaviour of investor, especially when we recognise their natural momentary incapacity to interpret and to incorporate the whole and instantaneously the available information, the momentum strategy loses its robustness and its returns becomes a hazardous event, especially with long J and K periods. And here we confirm Fama and French (1998) who conclude the profitability of the momentum strategies is a hazardous event. Nevertheless, the strategy on which focuses the paper i.e the 6/6 momentum strategy yields insignificant but still positive.
But are these returns still anomalous to the rational explanation which is exclusively based on risk explanation?

4.3. Based risk explanation of the adjusted 6/6 momentum strategy returns: estimation of the three-factorial model

To answer to the above question, we lead an estimation of the three-factorial model to explain the excess return yielded by the 6/6 adjusted momentum portfolios.

Table 6: The estimation of the three-factorial model

<table>
<thead>
<tr>
<th></th>
<th>α</th>
<th>β</th>
<th>s</th>
<th>h</th>
<th>R²</th>
</tr>
</thead>
<tbody>
<tr>
<td>The excess adjusted momentum returns</td>
<td>0.012</td>
<td>0.251</td>
<td>0.385</td>
<td>-0.135</td>
<td>0.64</td>
</tr>
<tr>
<td></td>
<td>(0.756)</td>
<td>(2.05)</td>
<td>(2.83)</td>
<td>(-1.95)</td>
<td></td>
</tr>
</tbody>
</table>

As it is shown in table 6, the three-factorial model succeeds this time to fully capture the momentum effect.

Especially, the 6/6 momentum strategy’ returns seem to be fully explained its underlying β and size effect. These results are expected, since the winner stocks are usually more sensible to the market variation, relatively to the loser ones (Zoghliami 2011). Idem, the significant positive coefficient relative to the size effect is also expected, since the winners stocks are on average smaller than the loser’s (zoghliami 2011). But, the 6/6 momentum portfolio still offers insurance against the devaluation effect, since the respective coefficient is still significantly negative. Also and according to our earlier work, this result is not surprising since the winner stocks are one average better valued by the market than the loser’s. Nevertheless, the most important result of this estimation is the non significance of the constant. This translates the success of the three-factorial model to capture the momentum effect. Besides we should outline the improvement of the explanation power of the three-factorial model.

5. Conclusion

The momentum effect in stocks’ returns calls into question the rational financial theory’ predictions that suppose efficiency and the unpredictability of stocks returns. Moreover it escapes to any rational and risk based explanation. Many behavioural financial researchers use this puzzling phenomenon as argument to extrapolate the psychologists’ experiences results and to break with market efficiency and with the investors’ full rationality.

In this paper we aimed to reconcile between the two theories, especially we argue to recognise the investors’ behavioural biases that induce over and under reactions which are translated into an autocorrelation among the stocks’ returns. Particularly, we propose to adjust returns from any behavioural biases, through the introduction of an autoregressive process. Then we consider henceforth the adjusted returns. Doing so, we succeed to propose a fully risk based explanation to the momentum effect.

More precisely, the three-factorial model failed to capture the 6/6 momentum strategy’ returns before considering autocorrelation, but when we consider the autocorrelation adjusted returns, we obtain revealing results: first we notice a decrease and sometimes a dissipation of the returns yielded by the adjusted momentum portfolios. Second, when we subject the autocorrelation adjusted 6/6 momentum strategy returns to the three-factorial estimation, we notice an improvement of the explanation power of the model; the constant is no longer significant. Third and finally the adjusted momentum strategy’ returns seem to be fully explained as market premium to some size effect and to high sensibility to the market variations.

References