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MOMENTUM AND REVERSAL EFFECTS IN BRAZIL

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Dissertação apresentada ao Departamento de Economia da Faculdade de Economia, Administração e Contabilidade da Universidade de São Paulo como requisito para a obtenção do título de Mestre em Ciências.

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Ao meu avô,
Prof. Milton Improta

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”...no matter how many instances of white swans
we may have observed, this does not justify the
conclusion that all swans are white.”

Karl Popper

RESUMO

Nos mercados financeiros, o efeito momento pode ser definido como a tendência dos preços em manter seus movimentos de curto prazo. Por outro lado, o efeito contrário é geralmente entendido como a mudança na direção dos movimentos de longo prazo dos preços. O presente trabalho examina a existência dos efeitos momento e contrário no mercado acionário brasileiro no período compreendido entre janeiro de 1999 e junho de 2012. A partir do cálculo de 1296 estratégias de investimento, nenhuma evidência de efeito contrário é encontrada. Com relação ao efeito momento, observou-se apenas uma fraca evidência no curtíssimo prazo. A exposição aos fatores de risco é capaz de explicar os retornos das estratégias, inclusive os retornos das estratégias de momento. Os resultados são robustos ao se utilizar diferentes especificações de proxy de mercado e subamostras de valor de mercado. Quando comparados a trabalhos anteriores, os resultados colocam em questão se o efeito contrário está desaparecendo no mercado acionário brasileiro e se as fracas evidências do efeito momento são suficientes para confirmar sua existência. Ademais, são observadas evidências de sazonalidade no mês de junho nas estratégias de momento e, no mês de novembro, em ambas as estratégias. Testes posteriores revelam que esses efeitos de sazonalidade estão restritos à subamostra de baixo valor de mercado.

ABSTRACT

In financial markets, momentum effect can be defined as the tendency of prices to maintain their short term movements. On the other hand, reversal effect is usually understood to be the change in direction of long term price movements. This paper examines whether momentum and reversal effects were in evidence in the Brazilian stock market between January 1999 and June 2012. After calculating 1296 trading strategies, no evidence of reversal effect is found. With regard to momentum effect, some weak evidence is presented for the very short term. Exposure to risk factors can explain returns on strategies, including returns on momentum strategies. The results are borne out with different market proxy specifications and size subsamples. When compared to previous studies, the results raise the question of whether the reversal effect is vanishing from the Brazilian stock market and whether the traces of momentum are sufficient to confirm its existence. Furthermore, evidence of seasonality is found for June in momentum strategies and for November in both reversal and momentum strategies. Subsequent tests reveal that the effects of seasonality are limited to small stocks.

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1. Introduction

Predictable behavior in the stock market has been a permanent question for academics as observed in the works of Levy (1967) and Fama (1965), for example. Along these lines of investigating whether investors overreact to information, De Bondt & Thaler (1985) document a reversal pattern in stock prices for the American stock market. This reversal effect is noted by observing the subsequent performance of extremely successful and unsuccessful stocks in recent years. The authors conclude that past long term losers outperform past long term winners and this cannot be accounted for by a higher exposure to risk. Subsequently, several works have been written along these lines, such as Chan (1988) and Chopra et al. (1992).

In contrast, Jegadeesh & Titman (1993) provide evidence that when selecting stocks based on a shorter horizon of 3 to 12 months, the opposite behavior reported by De Bondt & Thaler (1985) is observed. Thus, buying winners and selling losers from the last 3 to 12 months, generates significant returns which, indeed, cannot be explained by systemic risk bearing, and in fact is consistent with a market under reaction to firm-specific information. Strikingly, Jegadeesh & Titman (2001) confirm the continued existence of momentum effect with an additional 9 years of data from the point when momentum profits would have been expected to cease.

Costa (1994) was one of the first papers written on this subject for Brazil. This paper examines the existence of reversal effect between 1970 and 1989 using the methodology proposed by De Bondt & Thaler (1985). In line with the American study, Costa (1994) presents evidence that supports the existence of reversal effect in the Brazilian stock market. The reversal effect is statistically and economically significant for the period and also generates an abnormal return when risks are controlled by CAPM.

Subsequently, Bonomo & Dall'Agnol (2003) widen the research of reversal effect initiated by Costa (1994) and analyze the period from January/1986 to July/2000. By implementing the methodology presented in Chopra et al. (1992), the authors confirm a significant reversal in the long term. Furthermore, the authors replicate the tests for the short term strategies as in Jegadeesh & Titman (1993) and, surprisingly, find a reversal pattern that is even stronger than the one observed for the long term. Therefore, the conclusions confirm the results obtained by Costa (1994) and, indeed, reinforce evidence of a perva-

sive reversal component to the Brazilian stock market. However, the author reports that when the sample is divided between pre and post September/1994, any evidence for the long and short term disappears for the period after September/1994 with most of the strategies becoming statistically insignificant. Taking into account the discussion about the nature of profits from reversal strategies, the authors provide evidence that the yields cannot be explained either by market risk, size premium or liquidity premium. Moreover, the authors also describe an extraordinary return from the reversal strategies in January, documented in De Bondt & Thaler (1985).

Kimura (2003) studying momentum and reversal effects between July/1994 to December/2001 confirms the lack of evidence for reversal effect in the short term as documented in Bonomo & Dall'Agnol (2003) for a similar time period. In addition, the results indicate a statistically significant momentum effect when portfolios are held for four to five months, although their risk adjusted return is statistically insignificant. It should be noted that Kimura (2003) carries out an exercise similar to the one used by De Bondt & Thaler (1985), but limits analysis to very liquid stocks, around 38, a holding period of up to 24 weeks, and a ranking period of six months. Therefore, not all results obtained can be compared directly with the evidence cited by Bonomo & Dall'Agnol (2003).

Adopting the methodology of Jegadeesh (1990), Minardi (2004) provides evidence that strategies formed on the basis of one-to-twelve lagged returns are profitable for a period similar to the one studied in Kimura (2003), from September/1994 to August/2000. Since the portfolios are ranked each month based on predicted returns from auto-regressive regressions by stock, the relationship with past returns, whether positive or negative, is not exactly known, so it is not possible to affirm whether returns are due to momentum or a short term reversal effect. Nevertheless, this general evidence that past yields can help to predict future short term returns, together with the evidence for momentum provided by Kimura (2003) seem go against the result reported in Bonomo & Dall'Agnol (2003). Minardi (2004) also reports that the strategies earn abnormal returns under market model specifications. This result also holds up when taking transaction costs into consideration.

In a more recent study, Teixeira (2011) looks at the performance of value and momentum strategies in the ten-year period between 2001 and 2011. Using a non-overlapping strategy, portfolios are created on the basis of six months past returns and are then kept for a further six months. The author points out that the momentum strategy earned a

much lower cumulative return than the market and value benchmarks for the same period. Although statistical significance of momentum strategy is not displayed, the low cumulative return might indicate at least a weak momentum effect for the period and, therefore, seems to strengthen the results obtained in the late nineties that showed no trace of momentum effect.

Saturnino et al. (2012) also uses the same approach developed by De Bondt & Thaler (1985) with an additional characteristic, in that they form overlapping portfolios which are updated every six months. The authors examine the period from January/1995 through December/2010 and report the existence of reversal effect for the period, although when the sample is divided into pre and post 1999, the reversal pattern is much less pronounced in the more recent subsample. Once again, results appear to weakly support the continuation of the reversal effects in evidence in the eighties. Furthermore, as reported in Bonomo & Dall'Agnol (2003), Saturnino et al. (2012) concludes that the element of size presents a negative relationship with reversal strategies returns, however not at such a level to explain the performance.

As can be seen, barring a few exceptions, such as Bonomo & Dall'Agnol (2003), works usually tend to limit their analysis to selected momentum or reversal strategies and, thereafter evaluate the returns on the strategies using the CAPM model. The main contributions of this work are to studying momentum and reversal effects through 1296 trading strategies, which map very short and long term strategies, and also to implementing the Fama & French risk model, which considers two other sources of systemic risk to measure abnormal returns. With a recent dataset, January/1999 - July/2012, weak evidence is found in favor of a momentum effect and no evidence for a reversal effect. In addition, the returns for all the strategies can be explained by higher exposure to the Brazilian Fama & French three risk factors. Furthermore, a pattern of end-of-semester seasonality in momentum strategies and November seasonality for reversal and momentum strategies is documented. However, when the sample is stratified into two size subsamples, we observe that these results are confined solely to the small stocks subsample. In addition, all the results of the Fama & French three factor model are robust for two other market proxies that are commonly used.

Taking into account the results of this work and of previous literature, what could possibly explain such contrasting evidence about both effects in Brazil? One feasible hypothesis is

that the Brazilian financial market has made efficiency gains over the years and the initial evidence of a reversal effect in the eighties seems to be vanishing over time and the ambiguous evidence of a momentum effect remains until this day. However, this conjecture is puzzling, since momentum and reversal are still being documented in more developed, and theoretically more efficient financial markets, as can be seen in Asness et al. (2009). Therefore, to obtain stronger evidence, all the tested strategies in this paper should be examined for this dataset using the other three methodologies suggested in the literature to see whether the evidence gleaned from in this work hold up. This factor is a shortcoming of this paper and is left open for future developments.

The remainder of this work is structured as follows: In the next section the data is discussed. Subsection 2.2 examines the proxies for risk factors and reports some descriptive statistics as well as the dynamics of risk factors. Section 3. explains how trading strategies are assembled, Subsection 3.1 reports the average returns and statistical significance of the strategies, in Subsection 3.2 seasonality patterns are investigated, Subsection 3.3 evaluates the exposure to risk in the Fama & French framework. Subsection 3.5 divides the samples into two sizes and verifies whether results of subsections above hold up. Section 4. concludes and comments on the main results.

2. Data

2.1 Raw Data

The series used are stock price, book-to-market ratio, market value of the firm, market value of each asset class of the firm (if the company has more than one asset class), the IBOV market index, the MSCI market index, the SWAP rate as the risk free asset and the IPCA inflation index¹. With the exception of the SWAP rate, the MSCI market index and the IPCA, all the other series were collected from the Economatica database. The SWAP rate, the MSCI market index and the IPCA were obtained from the Bloomberg terminal, the MSCI site and the IBGE site, respectively. All the currency data are denoted in Brazilian currency and all the indexes are calculated from variations also derived from the same currency.

In order to work with data from a period that has shown more stable macroeconomic conditions, the data used in this work is limited to the period following the implementation of the floating exchange rate regime up to the last completed month available when this work was being undertaken, in other words, between 12/01/1998² and 06/29/2012. The data is shown in a monthly frequency, but prices are extracted daily in order to use them as a liquidity criterion as further detailed in the subsection 2.2 below. Nevertheless, for the purpose of tests and regressions in this work, the prices are transformed on a monthly basis selecting the last available price in the month.

2.2 Market and Fama & French Proxies

As pointed out by Roll (1977), the rejection of asset pricing models as in, for example, CAPM, is a rejection of the joint hypothesis of efficient markets and the pricing model. Thus, when a joint hypothesis is rejected, it is not possible to determine whether the efficiency of the model or of the market, or both are rejected. In the eighties, there were a number of empirical failures of CAPM documented in explaining portfolios with the same exposure to market risk (β) but a different level of certain characteristics, such as size, for example. Small stocks generated higher average returns than large stocks, even though both groups presented the same market β . As well as this size anomaly, which

¹For more details about definitions of the dataset, refer to Appendix A: Database Details.

²The entire month of December is utilized in order to consider the last available price of the month as the closing price.

was first reported by Banz (1981), other variables showed relationships to average returns that could not be explained for the market β . Some other variables are book-to-market ratio (B/M) and earnings-price ratio (E/P) documented by Rosenberg et al. (1985) and Basu (1983), respectively. Since CAPM is not able to explain these patterns in average returns, the returns are referred to as anomalies in the literature.

Studying these anomalies cited above, Fama & French (1992), assuming the market efficiency hypothesis, report that asset pricing models are multidimensional in risk and have two more sources of undiversifiable risk that are related to size and book-to-market ratio. In Fama & French (1993), the authors propose a model, based on their conclusions in Fama & French (1992), which incorporate two additional mimicking portfolios for systemic risks. Therefore, assuming the existence of more sources of common and undiversifiable risks besides the one considered in CAPM, the abnormal performance measured by Jensen's alpha as reported in Costa (1994), Bonomo & Dall'Agnol (2003) and Minardi (2004) may be due to a misspecification of the model. With that in mind, in order to add to the results achieved by these authors, the Fama & French risk factors for the Brazilian stock market are elaborated using a representative database that contemplates all stocks traded in Brazil's stock market (BMF&BOVESPA) for the period analyzed.

One of the risk factors in the Fama & French model is the traditional market risk. The market risk can be proxied by the real excess return of the market portfolio:

$$R_{t,k}^e = R_{t,k} - Swap_t$$

where k indicates the market proxy used, t indicates the month, $R_{t,k}$ is the real return of index k at month t , $Swap_t$ is real swap's fixed rate of return that represents the risk free rate and $R_{t,k}^e$ is real excess return of index k in month t . All returns are deflated using IPCA inflation's rate as shown below:

$$R_{t,k} = (1 + R_{t,k}^{Nom}) / (1 + IPCA_t) - 1$$

To overcome any kind of bias in proxies, three different mimicking portfolios are used in this work: IBOV, MSCI and a value weighted market index that considers all stocks in the dataset. This last proxy is calculated in the same way as in Fama & French (1993) and is referred to as MKT in this work. When compared to the other two proxies, it includes a greater number of stocks and therefore tends to be less exposed to idiosyncratic errors and is also more representative of the common market risk. Algebraically, the MKT's

nominal return is:

$$R_{t,MKT}^{Nom} = \sum_{i=1}^{N_{t-1}} r_{i,t}^{Nom} \left(\frac{ME_{i,t-1}}{\sum_{j=1}^{N_{t-1}} ME_{j,t-1}} \right)$$

where the N_{t-1} is the number of assets available at the end of month $t - 1$, $r_{i,t}^{Nom}$ is the nominal return of asset i during month t , $ME_{i,t-1}$ is the market value of asset i in the end of month $t - 1$.

With regard to the computation of the proxies for the additional two risk factors proposed by Fama & French (1993), essentially the same methodology proposed by these authors is applied in this work as described below:

1. By the end of June of year t , stocks are ranked by their market value (size).
2. Using the median value of size in the last trading day of June, the stocks are split into 2 groups: Small, if the stock's market value is below median, or Big, otherwise.
3. Stocks are ranked by their book-to-market value for December of the previous year ($t - 1$), excluding the ones with negative value.
4. Next, stocks are classified according to their December book-to-market value as Low if its value is below the third decile, as Medium if its value is between the third and the seventh decile and as High if its value is above the seventh decile.
5. By intersecting the two size portfolios and the three book-to-market portfolios, the six Fama & French portfolios are formed:

Table 1: 6 Fama & French Portfolios

	Low B/M	Medium B/M	High B/M
Small Size	SL	SM	SH
Big Size	BL	BM	BH

6. Afterwards, calculate the value-weighted return of each of the six portfolios.
7. To obtain the SMB (Small minus Big) factor (risk related to size), calculate the difference between the arithmetic average return of Small portfolios and that of large portfolios:

$$SMB = (SL + SM + SH)/3 - (BL + BM + BH)/3$$

8. Analogously, to obtain the HML (High minus Low) factor (risk related to B/M), perform the difference between the arithmetic average return of High B/M portfolios and Low B/M portfolios:

$$HML = (SH + BH)/2 - (SL + BL)/2$$

This work departs from the traditional methodology in two respects. The first is that not all the stocks that are available in the database are used to calculate the proxies for the factors. It is imposed a liquidity filter to restrict the stock universe to a more tradable group. This approach is adopted due to the fact that most investors, especially the bigger players, do not invest in very illiquid stocks. The liquidity restriction is set up to exclude stocks that are not traded at least once per week in the year preceding the formation date of the portfolio. The remaining stocks are eligible for allocation in the six Fama & French portfolios. The second difference is related to a characteristic of the Brazilian stock market. Historically, companies listed on the stock market issue two different classes of stocks: common stocks, referred to as ON, and preferred stock, known as PN³. Since both stocks are from the same company, their risk is related to the same company size source, thus it is chosen to allocate stocks in portfolios by their market firm value instead of their market class value, which can be different between classes.

Lastly, it is worth emphasizing the idea behind the extraction of the risk factors from two-dimensional portfolios. Assuming that, besides the market risk, two more risk factors exist, naturally, all stocks have exposure to these two systemic risks, though to different degrees. Therefore, although portfolios of book-to-market have more exposure to one of the risk factors, and size portfolios have more exposure to the other risk factor, all those portfolios are affected by both undiversifiable risks. Thus dividing stocks into portfolios using a two dimensional matrix enables control, or at least a reduced influence of one of the risks for each dimension. For example, when calculating the spread of return between the portfolios SH and SL, the size factor is roughly the same for both portfolios, so their exposure to the systemic risk related to size is controlled, and consequently the spread better reflects the underlying risk related to the book-to-market portfolios. Analogously, the same is valid for the spread between BH and BL. Also the analogous idea applies to the spreads between SL and BL, SM and BM and SH and BH in which the risk associated to B/M is controlled in order to extract the size risk proxy.

³The main difference between these two types is that the owner of the first one has the right to vote on certain matters of the company, but in return, receive dividends only after the owners of the preferred stocks have received them.

Some of the statistics and characteristics of the proxies are analyzed below⁴. In Table 2 the correlation between the three market risk proxies chosen can be seen. All of them have a high correlation with each other. One possible explanation for this relationship is that since the indexes are value-weighted and the capitalization of the Brazilian stock market is concentrated in a relatively small number of stocks when compared to other stock markets, it is not surprising that all of them present high correlation. Regarding the F&F proxies, if the two additional risks factors in the model are present, all the three risk factors, including market risk, must be linearly independent of each other or else they would not be risk factors. Given that the SMB and HML are designed to mimic the additional two risk factors, they must present no or little empirical correlation between themselves and the three market risk proxies. The results of Table 2 conclude that the magnitude of correlation is very low among HML and all the market risk proxies, and three times higher, although still low, between SMB and these three. The correlation between SMB and HML is the highest in magnitude among all the proxies' correlations, -20.79% , although not sufficiently high to create any concern about the qualities of the proxies and multicollinearity.

Table 2: Correlation Matrix between Proxies and F&F Portfolios

	6 F&F Portfolios						F&F Factors		Market Proxies	
	SL	SM	SH	BL	BM	BH	SMB	HML	IBOV	MKT
MSCI	66.90%	78.09%	74.43%	92.36%	94.85%	65.13%	-15.98%	-4.96%	95.76%	98.97%
MKT	71.21%	81.12%	77.49%	93.00%	95.40%	67.27%	-11.64%	-4.85%	96.48%	
IBOV	71.44%	78.39%	77.15%	87.17%	94.84%	70.24%	-11.91%	1.16%		
HML	-22.90%	3.90%	27.45%	-24.18%	3.15%	50.50%	-20.79%			
SMB	40.23%	33.41%	31.98%	-16.77%	-13.06%	-25.44%				
BH	57.41%	59.36%	62.24%	52.93%	63.93%					
BM	65.92%	76.63%	75.78%	81.37%						
BL	62.42%	70.39%	64.79%							
SH	70.03%	82.36%								
SM	74.86%									

Note: The correlations are calculated using real excess return on the swap fixed rate. In mind that the dataset starts at 12/01/1998 and the liquidity restriction requires one year of historical data, the first six Fama & French portfolios are formed in July of 2000. Thus, despite the availability of information for the others proxies, all the calculations made are restricted to the period between July/2000 until June/2012.

With regard to the premia, from table 3 the first prominent result is that two out of three proxies for market risk have non positive value and only the market proxy computed in

⁴For information about the average market firm value, the average book-to-market ratio and the number of stocks in the six Fama & French portfolios for each year of formation, see Appendix B: Fama & French Six Portfolios Tables.

this work, the MKT, seems to present a positive premium. Although this one is also statistically insignificant, it is an interesting result since, as we consider a wider and more holistic market proxy, it seems to get closer to the theoretical market portfolio capturing the positive premium that is expected by the asset pricing theories. In terms of the Fama & French factors, both present positive premia, however only the HML premium is statistically significant at 10% level. The result is different to the values presented in Fama & French (1998). The authors describe an annual size premium of around 11.94% for Brazil, approximately 0.94% on a monthly basis, although in both works the SMB premium is statistically insignificant. In addition, their estimated value premium is around 4.71% per month, which is more than six times higher than the value obtained in this work and with a p-value of around 2.33%.

Table 3: Summary Statistics for Real Excess Return

	Premium	St. Dev.	P-Value	Sharpe	Max.	Min.	%>0
SL	-0.31%	0.80%	70.03%	-0.39	23.69%	-27.51%	50.00%
SM	1.44%	0.70%	4.07%	2.07	26.27%	-30.31%	57.64%
SH	1.10%	0.71%	12.42%	1.55	21.35%	-20.10%	53.47%
BL	0.23%	0.58%	69.19%	0.40	15.81%	-25.80%	54.17%
BM	0.48%	0.64%	45.26%	0.75	21.83%	-26.20%	53.47%
BH	0.28%	0.71%	69.59%	0.39	27.50%	-24.47%	51.39%
SMB	0.41%	0.34%	23.15%	1.20	11.51%	-19.85%	53.47%
HML	0.73%	0.40%	6.72%	1.84	13.13%	-17.52%	52.78%
IBOV	-0.15%	0.67%	82.32%	-0.22	16.09%	-25.82%	48.61%
MKT	0.33%	0.55%	54.77%	0.60	15.88%	-23.75%	53.47%
MSCI	-0.08%	0.59%	89.10%	-0.14	16.83%	-26.53%	51.39%
SWAP	0.72%	0.05%	0.00%	14.75	2.36%	-1.14%	95.83%

Note: The statistics are calculated using real excess return, except for Swap which is considered the risk free rate. Swap's statistics are computed based on the real return. Premia are on a monthly basis, St. Dev. are Newey-West standard errors, Max. (Min.) indicates the maximum (minimum) profitability of the period, %>0 indicates the percentage of months with positive profitability. Considering that the dataset starts on 12/01/1998 and the liquidity restriction requires one year of historical data, the first six Fama & French portfolios are formed in July of 2000. Thus, despite the availability of information for the others proxies, all the calculations made are restricted to the period between July/2000 and June/2012.

Looking more closely at the six Fama & French portfolios, it can be noted that, except for the SL portfolio, the other two small portfolios behave accordingly to what is expected from the empirical evidence, that is, small portfolios present higher premia than the equivalent big portfolio with the same level of B/M. For example, the SH premium is higher than the BH premium. Furthermore, the results in the B/M dimension are not what

are observed for international data, which can be seen in Asness et al. (2009). In their paper, the authors divide assets into three portfolios according to their book-to-market and observe a monotonic increase in average return from the Low B/M portfolio to the High portfolio. This pattern is not observed for Brazilian stocks. As can be seen for both small and big portfolios, the medium book-to-market portfolio has the highest premium, followed by the High B/M portfolio and lastly by the Low B/M.

In terms of the Sharpe ratio, because of the negative premium observed in IBOV and MSCI proxies, their Sharpe ratios are also negative, but the MKT's Sharpe ratio is positive at around 0.6. Since the premia of F&F factors are higher than the MKT and their standard deviations are smaller, the resulting Sharpe ratios of F&F portfolios are two to three times higher than those presented in the market portfolio. It is worth noting that the biggest Sharpe ratio is produced by the SM portfolio. This portfolio, as already mentioned, has the highest premium, almost two times the HML factor, and its volatility is less than two times the HML factor volatility, resulting in a higher Sharpe ratio. Interestingly, all the Sharpe ratios are higher than the ones observed in Asness et al. (2009) for U.S., Europe and Japan.

The Figure 1 shows the excess return indexes for the six F&F portfolios, SMB and HML factors and the three market proxies. When observing the dynamics of the series, the impact of the 2008 financial crisis stands out clearly from the data. Until the crisis reached its lowest point, at around the end of 2008, the HML premium was positive, the SMB index orbited around its initial value of June/2000 and the SM and SH portfolios presented similar premia. After the critical months of the financial crisis, the HML premium started to decline almost around a negative trend. This negative performance was mainly because the Low B/M portfolios reverted their to bad past performance and began to generate positive premium whereas the High B/M portfolios diminished their premium by about 10 basis points. In addition, in the post-crisis period the SMB began to present a positive premium as the small stock portfolios increased their average performance from 0.22%

to 2.01% and the big stocks presented a minor increase in their premium, from 0.27% to 0.47%. Lastly, the performance of SM and SH portfolios used to be similar prior to the financial crisis, with a correlation of around 82% and premia of almost the same. Despite the correlation remaining around the same value, the SM premium increased from 0.93% to 2.66% while the SH premium rose only 14 basis points, from 1.06% to 1.2%.

Figure 1: Real Excess Return Indexes

Note: Indexes are built by setting the value 100 at the end of June of 2000 for the 6 portfolios of F&F, the 2 F&F factors (SMB and HML) and the 3 market factor proxies (IBOV, MKT and MSCI). The nominal returns were deflated by the IPCA and the excess return was obtained on the Swap fixed rate.

3. Momentum and Reversal Strategies

A wide range of trading strategies is tested in order to map how momentum and reversal effect are manifested in the Brazilian stock market and to understand their relationship. The strategies are formed by the cumulative return of J in recent months and by the K months of the holding period that the portfolios are maintained. Therefore, strategies can be identified as $J \times K$. In this work, 1296 overlapping strategies are examined as the combination of J and K months where both indexes can assume value from 1 to 36, thus the shortest strategy is the 1×1 and the longest strategy is the 36×36 .

The trading strategies are created as in Jegadeesh & Titman (1993). First, at the end of the month t the range of stocks is reduced to an eligible group of stocks that have all been traded at least once per week for the past 252 working days. Within this selected group, stocks are ranked by their past cumulative return of the previous J months. The ones located in the lowest decile (Losers), that is, stocks with the worst past performance in the previous J months, are sold and finance the purchase of the ones in the highest decile (Winners), forming a zero-cost portfolio. Stocks are equally weighted both in the long and short portfolios and are maintained for the next K months (until month $t + K$).

In month $t + 1$, the profitability of the zero-cost portfolio formed in t is calculated as the return of the long portfolio minus the return of the short portfolio. To offset the variation in prices during the month $t + 1$, the weights of each stock are equally rebalanced in both portfolios. Furthermore, a new zero-cost portfolio is formed in the same way that the portfolio in month t was formed, but based on the cumulative return from month $t + 1 - J$ to month $t + 1$. This new zero-cost portfolio is maintained for the next K periods (until $t + 1 + K$).

By the end of the month $t + 2$, the monthly profitability of both zero-cost portfolios, the one formed in t and the one formed in $t + 1$, are calculated. For this month, the return

of $J \times K$ strategy as a whole is the equally weighted average return of the two zero-cost portfolios. As carried out in month $t + 1$, another zero-cost portfolio is formed based on the cumulative returns from month $t + 2 - J$ to month $t + 2$. This procedure is continued until the last month of the sample which generates the return series of the $J \times K$ strategy.

Since each portfolio is held for K months, in $t + K^{th}$ month there will be K zero-cost portfolios held simultaneously. From this month on, the number of zero-cost portfolios for the strategy remains the same, given that the month after each one reaches its end, another one is made up. This way, until the last month of the sample, there will be K portfolios held simultaneously. Noting the extreme value that K can assume it can be seen that for a holding period of one month, $K = 1$, there will be no overlapping portfolios since all the formed portfolios last the minimum unit of time of the data, one month. On the other hand, for a holding period of 36 months ($K = 36$) from the 36th month after the first formation date there will be always 36 zero-cost portfolios held at the same time.

Intuitively, it's possible to consolidate this strategy as a fund that holds, at the same time, K zero-cost portfolios, and that is formed based on the past performance of the stocks. Every month a new zero-cost portfolio will be formed and the K^{th} older one is closed out. Therefore, the profitability of the fund will be equivalent to the return of the strategy $J \times K$.

3.1 Results

The returns of the trading strategies are equal to the returns of the winner portfolio minus the returns of the loser portfolio. With that in mind the strategies that presented positive average nominal returns are defined as momentum strategies since winners tended to maintain their good performance and the losers tended to continue to perform badly, or at least the winners kept up a better performance than the losers. On the other hand,

strategies with a negative average nominal return are defined as reversal strategies. Note that this terminology does not take into consideration the statistical significance of the average nominal return and, so, does not imply the existence of a momentum or reversal effect. In order to be considered evidence of momentum (reversal) effect, a strategy with positive (negative) average nominal return must be statistically significant at a 5% level as to maintain the consistency of this paper⁵.

As has been documented in the literature, a momentum effect is observed and defined in the short term, since it is basically the idea of inertia in price movements. Therefore, at first, it would not make sense to expect to find evidence of momentum for the medium and long terms. With regards to a reversal effect, there is usually evidence for longer periods related to the formation period as well as to the holding period. However, it has been observed in the very short term, as can be seen in Lehmann (1990), Jegadeesh (1990) and Lo & MacKinlay (1990) for international studies and Minardi (2004) for Brazil.

Averaging the monthly nominal returns for all the 1296 strategies⁶, it is clear from the Figure 2 the existence of some regions that might demonstrate a momentum or reversal effect for the Brazilian stock market. The strategies can be divided into five major areas. The first is delimited by strategies with $J \leq 12$ and $K \leq 12$ in which almost

⁵It is worth noting that momentum and reversal effects are abstract effects, i.e. they are not directly obvious from the data. The trading strategies defined in this section are just a way to capture both effects in stocks and do not exclude other possibilities.

⁶Since strategies are constituted by the number of months that each portfolio is held or, equivalently, by the number of portfolios held at the same time, the strategy will only be fully structured from the K^{th} month. Take, for example, strategies 3×1 and 3×2 . At the end of month t , the strategy 3×1 forms a portfolio based on the return between months t and $t - 3$ and held the portfolio for one month, during month $t + 1$. Note that strategy 3×2 will have the same portfolio held as strategy 3×1 during the month $t + 1$ because it ranks the stocks based on the same past performance, 3 past months, and, therefore, the returns for both strategies in month $t + 1$ will be the same. In this way, only from month $t + 2$ 3×2 will the strategy have the two zero-cost portfolios that fully characterize the strategy and, consequently, the returns of both portfolios will reflect the profitability of the strategy. The strategy with the longest formation period, $J = 36$, and the longest holding period, $K = 36$, will only be fully structured from the 72th month of the database (Jan/1999 is equivalent to $t=0$), 36 months to form the first portfolio and another 36 months to form all the 36 overlapping portfolios of the strategy. With that in mind, to measure profitability and proceed with the analyses of the strategies for the same time period and with the same number of observations, the return series of all the strategies are considered only from the 72th month of the data. Seeing as the return series used in this study is from Jan/1999 to Jun/2012, the strategies will be evaluated from Jan/2005 until Jun/2012.

half of the strategies present positive average nominal return. The strategy 2×2 is the most prominent strategy, reaching an average nominal return equal to 1.59%. The second area is composed of strategies formed from $13 \leq J \leq 21$ and $K \leq 18$ which present, in general, negative returns and suggest the existence of a reversal effect for stocks when past cumulative returns are longer than twelve months. This observed reversal trend for stocks is amplified when even longer historical returns are considered as can be seen in the third area defined, mainly, by strategies with $J \geq 22$ and $K \leq 18$. In this area, the strategies suggest a stronger reversal effect. In particular, strategies 28×3 and 28×4 present in magnitude high average nominal returns, around 1.65%. The fourth relevant region is defined roughly by strategies with $J \leq 12$ and $K \geq 13$. Although the magnitude of the average returns of these strategies is not as high as the latest area defined, this area represents an unexpected result since there is no documented reversal effect on the long run based on the recent past performance of stocks. The fifth, and last area, is characterized by strategies with $J \geq 13$ and $K \geq 18$ and do not present any peculiar behavior, all presenting average returns around zero.

Figure 2: Average Monthly Nominal Returns - No size distinction

Note: The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The y-axis represents the number of months used to calculate the past cumulative return in order to rank the stocks and the x-axis represents the number of months that the zero-cost portfolios will be maintained after the formation date.

Tables 4 and 5 present the average nominal returns of the strategies. Analyzing the statistical significance of the strategies, only one out of 1296 strategies can be considered statistically different from zero. This one is the 2×2 momentum strategy that earns 1.59% in average nominal return with a p-value of around 2.72%⁷. Although evidence of a momentum effect is presented in this paper, the observed pattern is different to that described in Jegadeesh & Titman (1993) and confirmed in Jegadeesh & Titman (2001) for

⁷Although there is little evidence of auto-correlation within strategy returns, the standard errors are corrected by Newey-West (1 lag) to account for any possible auto-correlations. Further explanations can be obtained in Greene (2008).

U.S.. The authors notice that zero-cost strategies with the formation period at between three to twelve months and holding periods between three to twelve months present, in general, a positive and significant return close to 1% per month. As can be seen in the Tables 4 and 5 below, the momentum effect in evidence with Brazilian stocks occurs for a shorter time period than that observed in the American market.

Besides the very short term evidence for momentum, the weakness of the effect in the Brazilian data calls attention vis-a-vis international results. From all the 16 strategies tested for the American market in Jegadeesh & Titman (1993), only one of them is not statistically significant. So, almost all the 16 strategies consistently indicate a continuation in performance in the short term. Additionally Rouwenhorst (1998), which forms a European momentum portfolio with the twelve most important stock markets, also reports that all the 16 zero-cost strategies tested are highly significant with a t-statistic generally above three and profits at around 1% per month. So, if the number of tested strategies for the short term (144) is taken into account, what is observed for Brazil is a fragile and dubious evidence of the momentum effect.

The debate about the existence of the momentum effect in Brazil is first introduced by Bonomo & Dall'Agnol (2003). The authors test analogous short term strategies examined in Jegadeesh & Titman (1993) for the period from January/1986 until July/2000. For all the 16 strategies, no evidence is found of the existence of a momentum effect in the Brazilian stock market, and in fact there is evidence of a significant reversal in prices. However, most results become insignificant when only the post-September/1994 period is analyzed.

Even though Bonomo & Dall'Agnol (2003) makes use of a methodology based on Chopra et al. (1992) and this work uses a similar approach to Jegadeesh & Titman (1993), the differences in the results do not seem to be caused by the distinct methodologies.

When examining both methodologies it is possible to see that both of them are based on overlapping portfolios, however the methodology proposed by Chopra et al. (1992) considers more information from the beginning of the sample than does the methodology presented in Jegadeesh & Titman (1993), which eliminates the initial $J + K$ months due to the building of the strategies. Thus, even for the same dataset, these characteristics of the methodologies are able to induce different average returns for analogous strategies. When distinct datasets are considered, as is the case for the work of Bonomo & Dall'Agnol (2003) and this paper, the resulting divergences can be much deeper, precisely due to differences in the data utilized. So it is conjectured that the differences in results are because Bonomo & Dall'Agnol (2003) employ data from the eighties that seemed to present a reversal effect, as already seen in Costa (1994). This argument gains force with the added fact that most of these short term strategies become insignificant when only the post-September/1994 period is analyzed by the authors.

Conversely, for a similar period as the second period analyzed by Bonomo & Dall'Agnol (2003), Kimura (2003) finds evidence that strategies with a holding period of around four to five months show momentum with an average return of around 3% per month. In addition, Minardi (2004) seeks to confirm, for the period from September/1994 until August/2000, whether short term past returns can forecast short term future returns through auto-regressive analysis as proposed by Jegadeesh (1990). The author reports that winning and losing portfolios, based on the predictions of the regressions, present a significant return. Due to the auto-regressive methodology it is not possible to affirm whether results are driven by momentum or by a reversal effect, although together with the evidence of Kimura (2003), they seem to contradict the absence of the evidence with regard to both effects that Bonomo & Dall'Agnol (2003) reported.

As can be seen, the evidence for a momentum effect is ambiguous in the second half of the nineties. Teixeira (2011) reaffirms this view from 2001 until 2011, providing results showing that portfolios formed on the basis of six months non-overlapping momentum

earned very low returns. Although the significance of the strategy is not reported, with its very low return, around 0.47% per month which is lower than the average inflation rate for the same period (0.54%), it can be inferred that the strategy might not be significant. So, together with the inferred results from Teixeira (2011), the evidence gathered for this work does not support the existence of a robust momentum effect in Brazil for the last decade. Gathering all the preceding results, a momentum effect still seems to be an ambiguous question and in the best case scenario the results point to a weak momentum effect.

De Bondt & Thaler (1985), applying reversal strategies to the American stock market from January 1926 to December 1982, find a sturdy reversal pattern for stocks with extremely good or bad performances over the last three years. By buying the losers and selling the winners, it generates around 24.6% of cumulative return in the following three years. In addition, portfolios with two and five years of formation and holding periods also display reversal behavior with a cumulative average return of around 10% and 32%, respectively. Taking into consideration that the strategies studied in this work are limited to a maximum of 36 months both to formation period and holding period, we can only partially compare the results of this paper with the ones obtained by these authors. In Figure 2, note that the strategies 24×24 and 36×36 and their surrounding strategies do not present signs of a reversal effect similar to the region near to strategy 28×4 . Their average nominal returns are close to zero and all of them are statistically insignificant as can be seen in Tables 4 and 5.

One of the first studies that examined a reversal effect for the Brazilian stock market is Costa (1994). The author applies the same methodology proposed in De Bondt & Thaler (1985) in order to evaluate the overreaction hypothesis during the period between 1970 and 1989. Essentially, the author corroborates the results presented by De Bondt & Thaler (1985) and notes that the magnitude of the effect is even bigger than that documented for the American stock market. Even though some years of the database (the middle 1980s) are characterized by high volatility, the author reports that the overreaction

remains significant even when these years are not taken into account. Subsequently, Bonomo & Dall'Agnol (2003), utilizing the methodology proposed by Chopra et al. (1992), reaffirm the results presented in Costa (1994) for the period of January/1986-July/2000. However, splitting the sample into before and after September/1994, the authors find that the reversal pattern is not observed for the post-September/1994 period. This result is in line with the lack of evidence reported in Kimura (2003). Although this last author focuses on the short term strategies, with a holding period of up to six months, Kimura (2003) do not find any evidence of a reversal effect from July/1994 until December/2000.

Similar to Costa (1994), Saturnino et al. (2012) applies De Bondt & Thaler (1985) methodology for the period from January 1995 until December 2010 and finds evidence in favor of reversal behavior for stocks that performed extremely badly or extremely well in three and five past year periods. These results seem to extend and reinforce the previous evidence provided by Costa (1994) for the eighties. Despite restricting the analysis after January/1999, the reversal pattern considerably diminishes in magnitude. In accordance with the absence of, or questionable evidence of an accumulated reversal effect over the last ten years, this paper does not record any sign of a reversal effect for the usual strategies, such as 24×24 and 36×36 . Even for the most prominent reversal strategies that are found in this study, near to strategy 28×4 , the results are not statistically significant as see in Tables 4 and 5. So, looking through past work on the subject, it seems that the reversal effect documented for the seventies and the eighties might be disappearing, as first suggested by Bonomo & Dall'Agnol (2003) and Kimura (2003) for the late nineties with the additional evidence provided by Saturnino et al. (2012) and by this paper.

Table 4: Average Nominal Return - No size distinction - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.19	0.70	0.67	0.18	0.34	0.35	0.16	0.12	-0.02	0.01	0.16	0.10	0.01	0.00	-0.06	-0.06	-0.11	-0.07
2	0.96	1.59	0.95	0.60	0.58	0.36	0.19	0.08	-0.05	-0.02	0.05	-0.05	-0.12	-0.21	-0.28	-0.29	-0.32	-0.28
3	1.07	0.80	0.47	0.26	0.10	-0.03	-0.30	-0.34	-0.26	-0.18	-0.24	-0.32	-0.45	-0.52	-0.56	-0.53	-0.50	-0.48
4	0.79	0.56	0.29	0.04	0.06	-0.12	-0.28	-0.26	-0.30	-0.36	-0.39	-0.50	-0.62	-0.69	-0.67	-0.63	-0.63	-0.62
5	1.01	0.74	0.37	0.21	0.07	-0.16	-0.21	-0.25	-0.36	-0.40	-0.46	-0.57	-0.67	-0.71	-0.69	-0.68	-0.66	-0.63
6	0.68	0.00	-0.26	-0.54	-0.60	-0.70	-0.79	-0.74	-0.75	-0.77	-0.80	-0.88	-0.89	-0.91	-0.88	-0.86	-0.83	-0.78
7	0.27	0.09	-0.23	-0.51	-0.34	-0.49	-0.61	-0.57	-0.64	-0.68	-0.72	-0.76	-0.77	-0.79	-0.77	-0.74	-0.70	-0.67
8	0.28	-0.14	-0.47	-0.41	-0.56	-0.71	-0.79	-0.82	-0.84	-0.86	-0.82	-0.82	-0.82	-0.82	-0.79	-0.74	-0.72	-0.69
9	0.41	-0.32	-0.24	-0.46	-0.57	-0.64	-0.71	-0.69	-0.74	-0.70	-0.70	-0.72	-0.79	-0.76	-0.70	-0.67	-0.64	-0.62
10	0.17	0.08	-0.05	-0.42	-0.48	-0.57	-0.60	-0.68	-0.67	-0.64	-0.59	-0.64	-0.63	-0.61	-0.57	-0.55	-0.52	-0.49
11	0.19	-0.03	-0.28	-0.57	-0.73	-0.81	-0.87	-0.82	-0.77	-0.68	-0.68	-0.70	-0.66	-0.66	-0.62	-0.59	-0.57	-0.56
12	-0.23	-0.31	-0.49	-0.85	-0.94	-0.97	-0.97	-0.91	-0.85	-0.86	-0.85	-0.82	-0.81	-0.79	-0.76	-0.74	-0.72	-0.71
13	-0.09	-0.50	-0.74	-0.91	-0.96	-0.95	-0.96	-0.86	-0.86	-0.83	-0.82	-0.82	-0.79	-0.77	-0.75	-0.71	-0.70	-0.66
14	-0.16	-0.56	-0.69	-0.83	-0.73	-0.85	-0.90	-0.91	-0.90	-0.87	-0.83	-0.86	-0.82	-0.80	-0.74	-0.71	-0.68	-0.67
15	-0.15	-0.50	-0.64	-0.76	-0.80	-0.87	-0.90	-0.90	-0.84	-0.84	-0.83	-0.85	-0.82	-0.78	-0.74	-0.68	-0.65	-0.63
16	-0.41	-0.84	-0.82	-1.01	-1.06	-1.03	-1.05	-0.98	-0.97	-0.94	-0.92	-0.89	-0.84	-0.79	-0.73	-0.67	-0.62	-0.61
17	-0.75	-0.78	-0.91	-1.04	-1.00	-1.06	-0.97	-0.97	-0.97	-0.94	-0.87	-0.83	-0.78	-0.73	-0.69	-0.65	-0.60	-0.58
18	-0.43	-0.91	-1.01	-1.18	-1.19	-1.16	-1.15	-1.07	-1.05	-0.93	-0.86	-0.87	-0.83	-0.78	-0.75	-0.72	-0.66	-0.64
19	-0.64	-1.07	-1.04	-1.10	-1.08	-1.08	-1.13	-1.07	-1.01	-0.92	-0.89	-0.92	-0.87	-0.83	-0.79	-0.73	-0.69	-0.69
20	-0.69	-0.99	-0.90	-0.89	-0.91	-1.01	-1.01	-0.91	-0.83	-0.77	-0.71	-0.73	-0.69	-0.64	-0.57	-0.54	-0.54	-0.52
21	-0.14	-0.68	-0.75	-0.90	-0.96	-1.05	-1.05	-0.98	-0.99	-0.94	-0.85	-0.85	-0.78	-0.69	-0.62	-0.63	-0.58	-0.52
22	-0.24	-0.63	-0.80	-0.89	-0.96	-1.05	-1.07	-1.01	-1.00	-0.90	-0.91	-0.90	-0.81	-0.72	-0.69	-0.66	-0.58	-0.51
23	-0.14	-0.67	-0.70	-0.88	-1.00	-1.09	-1.14	-1.06	-1.00	-0.96	-0.94	-0.89	-0.79	-0.77	-0.70	-0.62	-0.53	-0.42
24	-0.43	-0.64	-0.77	-0.99	-1.15	-1.25	-1.29	-1.24	-1.17	-1.12	-1.04	-0.98	-0.94	-0.85	-0.75	-0.66	-0.58	-0.50
25	-0.41	-0.97	-1.10	-1.28	-1.38	-1.42	-1.43	-1.36	-1.28	-1.20	-1.06	-0.99	-0.89	-0.78	-0.67	-0.60	-0.54	-0.47
26	-0.45	-0.96	-1.20	-1.37	-1.46	-1.46	-1.43	-1.37	-1.22	-1.08	-1.03	-0.94	-0.81	-0.72	-0.64	-0.58	-0.52	-0.44
27	-0.50	-1.28	-1.44	-1.62	-1.59	-1.55	-1.51	-1.33	-1.19	-1.09	-0.98	-0.83	-0.70	-0.59	-0.52	-0.46	-0.38	-0.34
28	-1.00	-1.53	-1.65	-1.65	-1.59	-1.53	-1.39	-1.23	-1.13	-1.03	-0.85	-0.76	-0.63	-0.53	-0.46	-0.37	-0.34	-0.25
29	-1.13	-1.60	-1.54	-1.48	-1.39	-1.27	-1.17	-1.08	-0.97	-0.81	-0.65	-0.46	-0.37	-0.28	-0.23	-0.19	-0.12	-0.12
30	-1.14	-1.48	-1.38	-1.41	-1.26	-1.17	-1.13	-1.00	-0.79	-0.59	-0.41	-0.30	-0.24	-0.17	-0.11	-0.06	-0.05	-0.05
31	-1.42	-1.48	-1.47	-1.36	-1.21	-1.14	-1.00	-0.78	-0.65	-0.48	-0.34	-0.24	-0.17	-0.13	-0.07	-0.05	-0.05	-0.06
32	-0.92	-1.34	-1.18	-1.09	-1.13	-1.06	-0.81	-0.58	-0.43	-0.24	-0.14	-0.08	-0.06	0.01	0.00	0.03	0.02	0.01
33	-0.64	-0.89	-0.85	-0.98	-0.98	-0.74	-0.59	-0.46	-0.31	-0.16	-0.06	0.00	0.08	0.10	0.10	0.09	0.09	0.11
34	0.01	-0.47	-0.77	-0.92	-0.75	-0.65	-0.51	-0.40	-0.28	-0.15	-0.04	0.06	0.08	0.07	0.07	0.08	0.08	0.12
35	-0.12	-0.81	-0.82	-0.68	-0.61	-0.54	-0.40	-0.30	-0.17	-0.06	0.04	0.10	0.08	0.08	0.09	0.11	0.15	0.14
36	-0.60	-0.92	-0.84	-0.82	-0.67	-0.58	-0.45	-0.37	-0.23	-0.08	0.04	0.08	0.09	0.10	0.12	0.14	0.14	0.11

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the nominal returns considers standard errors corrected by Newey-West with 1 lag.

Table 5: Average Nominal Return - No size distinction - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	-0.09	-0.07	-0.10	-0.06	-0.07	-0.05	-0.04	-0.08	-0.06	-0.07	-0.11	-0.10	-0.08	-0.07	-0.11	-0.09	-0.12	-0.14
2	-0.26	-0.28	-0.27	-0.23	-0.22	-0.18	-0.19	-0.20	-0.20	-0.26	-0.26	-0.24	-0.25	-0.27	-0.26	-0.27	-0.30	-0.31
3	-0.52	-0.52	-0.49	-0.46	-0.42	-0.40	-0.41	-0.43	-0.46	-0.46	-0.47	-0.45	-0.46	-0.44	-0.45	-0.48	-0.49	-0.46
4	-0.62	-0.61	-0.59	-0.54	-0.51	-0.51	-0.52	-0.56	-0.58	-0.59	-0.60	-0.59	-0.56	-0.55	-0.57	-0.58	-0.55	-0.54
5	-0.61	-0.61	-0.57	-0.53	-0.51	-0.53	-0.55	-0.58	-0.58	-0.58	-0.60	-0.56	-0.56	-0.57	-0.58	-0.55	-0.53	-0.49
6	-0.76	-0.75	-0.72	-0.70	-0.70	-0.72	-0.74	-0.77	-0.76	-0.76	-0.76	-0.73	-0.73	-0.74	-0.71	-0.68	-0.64	-0.61
7	-0.64	-0.64	-0.63	-0.64	-0.64	-0.67	-0.69	-0.70	-0.69	-0.70	-0.68	-0.68	-0.68	-0.63	-0.61	-0.57	-0.51	-0.47
8	-0.67	-0.66	-0.67	-0.68	-0.67	-0.68	-0.67	-0.68	-0.67	-0.67	-0.69	-0.68	-0.66	-0.63	-0.58	-0.54	-0.50	-0.46
9	-0.58	-0.59	-0.62	-0.62	-0.63	-0.61	-0.61	-0.61	-0.61	-0.63	-0.63	-0.60	-0.58	-0.53	-0.48	-0.45	-0.41	-0.37
10	-0.47	-0.49	-0.51	-0.53	-0.52	-0.51	-0.50	-0.51	-0.53	-0.54	-0.53	-0.50	-0.44	-0.39	-0.35	-0.31	-0.27	-0.23
11	-0.55	-0.57	-0.59	-0.58	-0.55	-0.54	-0.55	-0.59	-0.59	-0.58	-0.54	-0.47	-0.44	-0.39	-0.34	-0.29	-0.25	-0.24
12	-0.69	-0.68	-0.67	-0.66	-0.63	-0.61	-0.64	-0.67	-0.64	-0.61	-0.55	-0.51	-0.45	-0.38	-0.34	-0.30	-0.29	-0.30
13	-0.64	-0.63	-0.62	-0.62	-0.60	-0.61	-0.64	-0.63	-0.60	-0.54	-0.50	-0.44	-0.38	-0.33	-0.29	-0.28	-0.29	-0.29
14	-0.65	-0.63	-0.62	-0.60	-0.61	-0.62	-0.60	-0.58	-0.53	-0.51	-0.45	-0.38	-0.35	-0.30	-0.29	-0.30	-0.31	-0.32
15	-0.61	-0.59	-0.58	-0.58	-0.58	-0.56	-0.54	-0.49	-0.47	-0.42	-0.36	-0.32	-0.27	-0.25	-0.26	-0.27	-0.29	-0.29
16	-0.59	-0.57	-0.58	-0.58	-0.55	-0.52	-0.47	-0.45	-0.41	-0.35	-0.32	-0.26	-0.24	-0.24	-0.26	-0.27	-0.27	-0.27
17	-0.56	-0.58	-0.57	-0.54	-0.48	-0.41	-0.39	-0.34	-0.29	-0.26	-0.20	-0.17	-0.15	-0.15	-0.17	-0.17	-0.20	-0.21
18	-0.61	-0.57	-0.53	-0.51	-0.44	-0.41	-0.36	-0.31	-0.30	-0.25	-0.22	-0.20	-0.19	-0.18	-0.20	-0.21	-0.23	-0.23
19	-0.66	-0.62	-0.56	-0.48	-0.42	-0.37	-0.31	-0.29	-0.25	-0.24	-0.22	-0.21	-0.21	-0.20	-0.21	-0.23	-0.25	-0.23
20	-0.47	-0.42	-0.34	-0.30	-0.25	-0.19	-0.16	-0.12	-0.11	-0.11	-0.11	-0.10	-0.09	-0.09	-0.10	-0.12	-0.11	-0.10
21	-0.44	-0.37	-0.32	-0.26	-0.20	-0.17	-0.14	-0.13	-0.14	-0.14	-0.15	-0.14	-0.13	-0.14	-0.16	-0.13	-0.14	-0.11
22	-0.42	-0.38	-0.32	-0.26	-0.24	-0.19	-0.17	-0.17	-0.18	-0.19	-0.19	-0.19	-0.18	-0.18	-0.16	-0.16	-0.15	-0.12
23	-0.37	-0.30	-0.23	-0.22	-0.17	-0.16	-0.17	-0.18	-0.21	-0.21	-0.21	-0.20	-0.20	-0.17	-0.18	-0.15	-0.13	-0.11
24	-0.42	-0.35	-0.34	-0.30	-0.27	-0.27	-0.27	-0.29	-0.30	-0.31	-0.30	-0.30	-0.27	-0.26	-0.24	-0.20	-0.18	-0.16
25	-0.39	-0.37	-0.32	-0.29	-0.28	-0.28	-0.30	-0.32	-0.33	-0.33	-0.33	-0.29	-0.29	-0.26	-0.23	-0.21	-0.19	-0.17
26	-0.40	-0.33	-0.31	-0.29	-0.29	-0.30	-0.32	-0.33	-0.34	-0.34	-0.30	-0.30	-0.30	-0.25	-0.23	-0.19	-0.18	-0.15
27	-0.26	-0.25	-0.26	-0.25	-0.26	-0.27	-0.28	-0.29	-0.30	-0.30	-0.30	-0.30	-0.28	-0.24	-0.23	-0.21	-0.18	-0.17
28	-0.22	-0.23	-0.22	-0.22	-0.22	-0.23	-0.24	-0.26	-0.24	-0.24	-0.24	-0.23	-0.22	-0.19	-0.18	-0.17	-0.17	-0.16
29	-0.11	-0.11	-0.11	-0.12	-0.12	-0.13	-0.14	-0.13	-0.14	-0.16	-0.15	-0.14	-0.14	-0.14	-0.14	-0.14	-0.15	-0.12
30	-0.05	-0.07	-0.06	-0.07	-0.07	-0.08	-0.06	-0.08	-0.10	-0.11	-0.10	-0.10	-0.10	-0.09	-0.10	-0.10	-0.09	-0.08
31	-0.04	-0.02	-0.03	-0.03	-0.02	0.01	0.01	-0.02	-0.02	-0.01	-0.01	-0.03	-0.02	-0.01	-0.03	-0.02	-0.03	-0.05
32	0.02	0.03	0.01	0.02	0.05	0.05	0.03	0.04	0.04	0.04	0.02	0.03	0.02	0.02	0.03	0.02	0.00	-0.01
33	0.14	0.12	0.12	0.16	0.16	0.16	0.15	0.12	0.10	0.07	0.07	0.08	0.08	0.09	0.08	0.07	0.05	0.02
34	0.12	0.11	0.12	0.13	0.14	0.16	0.14	0.11	0.08	0.08	0.07	0.07	0.09	0.09	0.08	0.08	0.04	0.03
35	0.12	0.14	0.15	0.15	0.16	0.17	0.16	0.12	0.10	0.08	0.07	0.09	0.09	0.09	0.10	0.08	0.06	0.04
36	0.14	0.14	0.13	0.14	0.15	0.14	0.11	0.08	0.06	0.05	0.06	0.07	0.07	0.08	0.06	0.05	0.03	0.02

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the nominal returns considers standard errors corrected by Newey-West with 1 lag.

3.2 Seasonality

In the literature, seasonality patterns are found both for the momentum effect and for the reversal effect. Jegadeesh & Titman (1993) document a high negative performance of momentum strategies in January, around -6.86% of return with a t-statistic close to -3.52 . In addition, the authors report a negative relationship between this January seasonality and size. Dividing the sample into three different sample sizes, they observe that for the smallest sample size the negative return in January is higher in magnitude and for the biggest sample size the coefficient presents a smaller impact and is statistically insignificant. These results were confirmed in an out-of-sample test carried out by the same authors with an additional nine years of data, as can be seen in Jegadeesh & Titman (2001).

In addition, De Bondt & Thaler (1985) also describe a seasonal pattern for the returns of reversal strategies with the opposite impact on returns than the one presented for momentum strategies. The authors comment that a common explanation relating to seasonal patterns in January is the tax-loss selling interpretation, but they do not believe that this hypothesis explains the results obtained very well. The idea of tax-loss selling is that at the end of the fiscal year the market participants sell their losing stocks merely to offset the gains from other securities and so diminish taxable income. Then, at the beginning of the next year the market participants re-construct their portfolios buying the losers from the end of the previous year. By doing this, the reversal strategies would present a decline in return at the end of the year and an equivalent increase at the beginning of the next, as described above. However, De Bondt and Thaler argue that the rise in prices is much higher than the decline every year in their sample and so is not consistent, and usually brings about a return to equilibrium.

As mentioned above, only statistically significant strategies can be considered as evidence for the existence of a reversal or momentum effect. Although most of the strategies in

this paper do not meet this requirement, seasonal patterns are verified between the most prominent strategies for each of the areas defined in Subsection 3.1 to, at least, suggest a seasonality comparable with other works. In order to provide stronger evidence of seasonal patterns in each area, a panel regression was estimated, taking into consideration the strategies with absolute average nominal returns in the last decile. In other words, if the area is defined as a momentum area, the strategies with the highest average returns are selected and if the area is defined as a reversal area, the strategies with the lowest average returns are considered⁸. This approach is interesting since it takes advantage of the numerous trading strategies tested and is less exposed to the idiosyncratic characteristics of individual strategies. The panel regressions considers different auto-correlations for the cross-section units of the panels, heteroscedastic errors between cross-section units and covariance between cross-section units that are constant over time.

Table 6: Seasonality Pattern of Last Decile - Nominal Returns - No size distinction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Momentum Strategies												
Coefficients	-0.12	2.12	-1.07	0.27	-0.15	5.70	1.95	1.79	2.71	-0.10	3.90	3.17
P-Value	94.84	26.48	57.20	88.65	93.65	0.28	33.46	37.69	18.17	95.90	5.49	11.71
Reversal Strategies (Short Run1)												
Coefficients	-1.59	2.76	3.05	1.05	3.73	0.31	-3.09	-1.71	0.08	1.19	-5.93	-3.46
P-Value	46.96	21.08	16.60	63.24	9.08	88.94	19.01	46.66	97.15	61.38	1.18	14.16
Reversal Strategies (Short Run2)												
Coefficients	-4.68	1.11	4.47	1.05	1.58	-0.26	-1.00	-1.56	-1.42	0.45	-9.02	-3.31
P-Value	2.33	59.24	3.03	61.24	44.52	90.24	65.09	47.85	52.08	83.92	0.00	13.31
Reversal Strategies (Long Run)												
Coefficients	-1.00	-1.18	0.62	-0.89	-0.20	0.24	-0.79	-0.60	0.61	-0.87	-2.65	-1.04
P-Value	15.54	9.48	37.80	20.80	77.63	73.43	29.64	42.76	41.59	24.73	0.05	16.94

Note: The values above are expressed in percentage numbers. Momentum Strategies are defined by the strategies with indexes $J \leq 12$ and $K \leq 12$, Reversal Strategies (Short Run1) by $13 \leq J \leq 21$ and $K \leq 18$, Reversal Strategies (Short Run2) by $J \geq 22$ and $K \leq 18$ and Reversal Strategies (Long Run) by $J \leq 12$ and $K \geq 13$.

The Table 6 above does not confirm the seasonality pattern observed for momentum strategies as reported by Jegadeesh & Titman when observing that, although the January coefficient is also negative, its p-value is extremely high. However an interesting element of seasonality appears. It can be observed that in June the strategies reach an average

⁸Once again, the sign of the average return relates to whether past winners outperformed past losers and, therefore, defines whether the strategy is a momentum or reversal strategy. It must not be interpreted as a strategy that performed badly.

return of around 5.70% which is highly significant. In addition, regardless of the statistical insignificance of November and December coefficients, the regressions suggest an interesting pattern of high returns at the end of the semesters. However, no reasons or patterns that may be able to justify this seasonality are raised and further research must be carried out to clarify this matter.

Bonomo & Dall’Agnol (2003) report an increase in magnitude for the returns on reversal strategies for January. Although the tax income from capital gains in Brazil is calculated on a monthly basis, the result is in keeping with the tax-loss selling hypothesis. In accordance, in this paper all the areas of reversal present a negative return in January, although only the area termed as Reversal Strategies (Short Run2) presents a statistically significant coefficient. In addition, an interesting November seasonality with high p-values is documented for all the three reversal areas. Note that, even though all of them are reversal strategies, their formation and holding period can be very different, but even then, a unique pattern seems to exist for the three areas.

Below, seasonality regressions are evaluated only for significant strategies, in order to compare the results obtained above and to see whether the major conclusions hold. Since only momentum strategy 2×2 is significant, below we display the results for this single regression. As can be seen in Table 7, although the coefficients for June, November and December are positive, all of them are statistically insignificant. So the joint patterns for momentum strategies observed in Table 6 are not corroborated by the momentum strategy 2×2 .

Table 7: Seasonality Pattern of Nominal Significant Strategy - No size distinction

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2×2												
Coefficients	-1.02	2.39	-2.26	0.38	1.71	4.09	1.15	1.32	3.25	2.13	4.16	2.83
P-Value	64.92	28.62	31.38	86.69	44.58	6.75	63.09	58.19	17.50	37.44	8.25	23.69

Note: The values above are expressed in percentage numbers. The 2×2 refers to trading strategy with $K=2$ and $J=2$.

3.3 Risk Adjusted

The strategies' return presented in Subsection 3.1 may be due to compensation for a higher exposure to risk. In other words, trading strategies can, systematically, promote the purchase of stocks with higher exposure to risk and sell stocks with lower exposure to risk and, consequently, earn higher average returns. In the literature, a benchmark model to evaluate exposure of assets to risk is shown with the three factor model Fama & French (1993). Even though there is a discussion about the validity of this model, since it is developed empirically without any straightforward relationship with economic variables or without theoretical foundation, the model is often used to quantify the exposure of assets to risk.

Since premia are expressed in real returns, all the nominal returns of the zero-cost portfolios above must be deflated by the monthly rate of IPCA. Deflating the nominal returns keeps roughly the same patterns between strategies observed in Figure 2, because it lowers all absolute average returns by about the average monthly inflation rate⁹. However, it is important to note that for some strategies with average return of around zero, their premia present the opposite signals to the one presented by the average nominal return. That means that their absolute average nominal return is below the average inflation rate and so their average real return changes the signal. Taking that into consideration, in order to identify the strategies that have positive average nominal return, the cells in the Tables that display premia or alpha are shaded in light gray. This helps identify which strategies are originally defined as momentum strategies. For the sake of brevity, the average real returns are not displayed in the body of the text, but can be accessed in the Appendix C: Average Real Returns in Tables 25 and 26.

⁹Suppose $r_{J \times K,t}^{nom}$ is the nominal return of strategy $J \times K$ in month t and π_t is the inflation rate of the same month. Since rates are discrete, the deflated rate is $r_{J \times K,t}^{real} = (1 + r_{J \times K,t}^{nom}) / (1 + \pi_t) - 1$. When considered a function of the π_t , the deflated rate can be approximated by a Taylor series around zero: $r_{J \times K,t}^{real} \approx r_{J \times K,t}^{nom} - (1 + r_{J \times K,t}^{nom})\pi_t$. As monthly inflation rates are low, terms higher than first order and cross terms can be considered close to zero so $r_{J \times K,t}^{real} \approx r_{J \times K,t}^{nom} - \pi_t$. Thus taking expectations from both sides it can be observed that the average real return is equal the average nominal return minus the average inflation rate, approximately.

The Fama & French model is described as:

$$E[R_i - R_f] = \beta_i^m E[(R_m - R_f)] + \beta_i^{SMB} E[SMB] + \beta_i^{HML} E[HML]$$

where R_i is the return of asset i , and R_f is the risk free rate, $R_m - R_f$, SMB and HML are proxies for risk factors and β_i^m , β_i^{SMB} , β_i^{HML} are the exposure of asset i to the proxies. Since the strategies are zero-cost portfolios, they are spread returns and, so, already in excess returns. Therefore:

$$E[R_i^{Spread}] = \beta_i^m E[(R_m - R_f)] + \beta_i^{SMB} E[SMB] + \beta_i^{HML} E[HML]$$

where R_i^{Spread} is the return of strategy $i = 1x1, \dots, 1x36, 2x1, \dots, 2x36, \dots, 36x36$, and all the other variables are the same.

Taking into account the results of Subsection 2.2 among the three market proxies it can be seen that, although statistically significant, the only one with a positive risk premium was the MKT. Thus, to implement the Fama & French model this proxy was chosen over the other two. Empirically the model is:

$$R_i^{Spread} = \hat{\alpha}_i + \hat{\beta}_i^{MKT}(R_{MKT} - R_f) + \hat{\beta}_i^{SMB} SMB + \hat{\beta}_i^{HML} HML + \hat{u}_i$$

Assuming that Fama & French model holds up, a straightforward implication of the risk model in Equation 3.3 for the momentum and reversal strategies is that $\hat{\alpha}_i$ must be equal to zero¹⁰. That means that strategies only generate a selection of riskier stocks for a long position and less riskier stocks for a short position¹¹ and, thus, additional return is not earned without higher exposure to risk factors.

Otherwise, if $\hat{\alpha}_i$ is statistically different from zero it can be interpreted in alternative ways. The first obvious interpretation is that the results are driven by a sample bias or

¹⁰As can be seen in Cochrane (2005), Chapter 12.

¹¹They are referred to as the long and short positions to remain general enough, since for momentum strategies the long position is composed of past winners and for reversal strategies of past losers.

data snooping which must not survive a change in the database, such as, for example, an extension to the period of analysis, a wider and more representative set of stocks to be tested or a different stock market. The second common view is that it implies that the efficient market hypothesis (EMH) does not hold. In this view, behavior theories are alternative explanations that seek to explain those anomalies relying on the failure of rational agents. The third common implication is that, assuming EMH holds and that good proxies are used, this anomaly is an expression of a missing risk factor in the three risk factor model. Therefore, any of the three interpretations can be given to the results of this study.

All the 1296 strategies are regressed for the proxies of the risk factors using *OLS* method and correcting the standard errors by Newey-West with 1 lag¹². As can be observed in the table 8 and 9, the momentum strategy 2×2 generates a very high alpha near 1.23% per month which is equivalent to around 15.8% per year. However, the strategy is marginally insignificant when controlled for their exposure to risk factors, presenting a p-value close to 5.57%. This result confirms what is observed in Kimura (2003) for the second half of the nineties. The author tests the exposure of three momentum strategies that would be similar to the strategies 6×4 and 6×5 in this work and also conclude that momentum strategies do not generate abnormal returns. Even applying the CAPM, which considers only one source of systemic risk, the author reports alphas statistically insignificant at a 5% level. By contrast Minardi (2004) regress the returns of winning portfolios and losing portfolios on three different proxies for market return, IBOV, IBX and an equally weighted market return. For all three proxies, both portfolios present alphas statistically significant at a 5% level, except for the IBOV regression, whose alphas are only statistically significant at 10% level.

De Bondt & Thaler (1985) reports that the spread return between losing and winning portfolios cannot be accounted for as bearing a higher risk. In fact, the exposure to systemic risk of the market is negative due to winning and losing portfolios presenting,

¹²The same observation written in footnote 7 is valid.

on average, a beta equal to 1.369 and 1.026, respectively. Nonetheless as Chan (1988) remarks, the estimation of betas made by De Bondt & Thaler (1985) are affected by changes to exposure to risk both in winning and losing portfolios. Because size is a proxy for risk and during the ranking period the winning and losing portfolios suffer a great variation in their market cap, the estimates of betas with formation period returns tend to underestimate the riskiness of losing portfolios and overestimate the riskiness of winning portfolios. In order to overcome that, Chan (1988) estimate the Sharpe-Lintner CAPM using returns of the holding periods instead of the ranking period. As a consequence the author documents a decrease in abnormal return measured by CAPM's alpha, although it is still statistically significant.

Costa (1994) replicates the risk analysis proposed by Chan (1988) and reports an average alpha of around 1.5% per month with a t-statistic of 3.04. Therefore the author concludes that differences in levels of risk cannot explain the returns of the reversal strategies for Brazilian stocks. Taking into account the discussion about the influence of market capitalization and risk on returns for reversal strategies, Bonomo & Dall'Agnol (2003) controls the reversal effect returns for the influence of beta, market capitalization and liquidity¹³ and still obtain a significant return of around 0.91%. On the other hand, Kimura (2003) reports that, in addition to the fact that any reversal strategy can be considered statistically different to zero, when also controlled for risk, any strategies present a significant coefficient. From the Tables 8 and 9 it is clear that in a more recent period the results corroborate the evidence of Kimura (2003). So, when analyzing together all of this evidence, there is also a suggestion that some changes in the efficiency of the Brazilian stock market occurred in the second half of the nineties which have been maintained until today.

Finally, from the Table 9, it can be seen that the long term strategies 1×28 and 1×32 are statistically significant. Remembering that since these strategies have no shaded cells,

¹³As noted by the authors, liquidity is an essential driver of returns for the Brazilian stock market and thus presents a significant negative premium.

it means that, originally, they were defined as reversal strategies. So a positive alpha actually means that if the strategies were applied, they would generate a negative alpha, or in other words, a return below their exposure to systemic risks. In addition, although these strategies present a significant alpha, to the knowledge of the author there has not been any evidence of strategies that show statistically significant returns like these for international studies and, particularly, for Brazil. The lack of evidence in the literature and the lack of economic sense of these strategies indicates that the results may be a statistical fluke.

Table 8: Fama & French Alphas Regressions with MKT market proxy - No size distinction - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.30	0.38	0.30	-0.24	0.00	0.05	-0.16	-0.17	0.49	-0.29	-0.12	-0.21	-0.29	-0.31	0.44	0.45	0.40	0.45
2	0.73	1.23	0.50	0.19	0.23	0.04	-0.11	-0.20	0.50	0.55	-0.21	0.49	0.44	0.34	0.27	0.27	0.24	0.28
3	0.51	0.30	-0.04	-0.18	-0.29	0.45	0.20	0.19	0.30	0.39	0.32	0.22	0.09	0.02	-0.01	0.03	0.08	0.10
4	0.22	0.11	-0.12	-0.35	-0.28	0.42	0.27	0.31	0.29	0.22	0.18	0.06	-0.05	-0.11	-0.09	-0.04	-0.03	-0.01
5	0.46	0.34	0.00	-0.09	-0.21	0.42	0.41	0.38	0.28	0.23	0.16	0.05	-0.05	-0.08	-0.05	-0.03	0.00	0.02
6	0.24	0.46	0.24	-0.02	-0.03	-0.10	-0.18	-0.13	-0.13	-0.16	-0.19	-0.26	-0.27	-0.28	-0.24	-0.20	-0.17	-0.12
7	-0.14	-0.15	0.40	0.17	0.39	0.23	0.11	0.16	0.09	0.04	0.00	-0.04	-0.05	-0.06	-0.02	0.01	0.03	0.06
8	-0.02	0.44	0.15	0.28	0.16	0.02	-0.06	-0.08	-0.09	-0.11	-0.07	-0.07	-0.06	-0.05	-0.02	0.03	0.05	0.07
9	0.20	0.36	0.45	0.25	0.15	0.09	0.03	0.06	0.02	0.05	0.05	0.04	-0.02	0.00	0.07	0.11	0.13	0.14
10	0.05	0.05	0.72	0.36	0.31	0.24	0.20	0.13	0.14	0.18	0.24	0.19	0.20	0.22	0.26	0.28	0.29	0.31
11	-0.01	0.67	0.44	0.18	0.05	-0.01	-0.05	0.01	0.06	0.17	0.16	0.15	0.19	0.18	0.22	0.24	0.24	0.24
12	0.46	0.38	0.23	-0.08	-0.13	-0.15	-0.15	-0.07	0.00	-0.02	-0.02	0.01	0.02	0.04	0.06	0.07	0.08	0.08
13	0.56	0.24	0.05	-0.09	-0.11	-0.09	-0.08	0.03	0.03	0.04	0.04	0.03	0.06	0.08	0.09	0.11	0.11	0.14
14	0.55	0.20	0.12	0.02	0.13	0.03	-0.02	-0.04	-0.04	-0.02	0.01	-0.03	0.01	0.01	0.06	0.09	0.10	0.11
15	0.59	0.30	0.21	0.11	0.10	0.04	0.01	0.00	0.04	0.03	0.02	-0.01	0.01	0.03	0.07	0.11	0.13	0.14
16	0.36	-0.03	0.03	-0.12	-0.14	-0.11	-0.12	-0.07	-0.07	-0.06	-0.06	-0.04	0.00	0.04	0.08	0.14	0.18	0.18
17	0.03	0.06	-0.04	-0.12	-0.07	-0.11	-0.04	-0.06	-0.06	-0.06	0.00	0.03	0.07	0.10	0.13	0.16	0.20	0.21
18	0.36	-0.03	-0.11	-0.27	-0.26	-0.23	-0.24	-0.16	-0.16	-0.05	0.01	-0.03	0.00	0.04	0.05	0.07	0.13	0.14
19	0.22	-0.16	-0.13	-0.16	-0.14	-0.15	-0.19	-0.14	-0.11	-0.04	-0.02	-0.07	-0.03	0.00	0.03	0.07	0.10	0.09
20	0.20	-0.07	0.03	0.05	0.02	-0.06	-0.06	0.04	0.11	0.14	0.18	0.14	0.17	0.21	0.26	0.28	0.27	0.27
21	0.73	0.23	0.14	0.00	-0.04	-0.12	-0.13	-0.06	-0.09	-0.05	0.01	-0.01	0.06	0.14	0.19	0.17	0.20	0.26
22	0.62	0.25	0.09	0.01	-0.04	-0.13	-0.16	-0.11	-0.12	-0.04	-0.07	-0.08	0.01	0.09	0.10	0.11	0.20	0.26
23	0.65	0.17	0.16	0.01	-0.10	-0.20	-0.27	-0.19	-0.16	-0.14	-0.14	-0.10	0.00	0.01	0.05	0.14	0.23	0.34
24	0.36	0.22	0.10	-0.12	-0.29	-0.41	-0.46	-0.43	-0.38	-0.34	-0.27	-0.23	-0.20	-0.13	-0.02	0.06	0.14	0.22
25	0.44	-0.08	-0.24	-0.42	-0.51	-0.58	-0.59	-0.54	-0.47	-0.40	-0.27	-0.22	-0.13	-0.02	0.08	0.15	0.21	0.28
26	0.30	-0.16	-0.39	-0.55	-0.63	-0.64	-0.63	-0.57	-0.42	-0.28	-0.25	-0.18	-0.05	0.04	0.12	0.18	0.24	0.33
27	0.28	-0.47	-0.63	-0.82	-0.78	-0.74	-0.71	-0.54	-0.41	-0.32	-0.23	-0.09	0.05	0.16	0.23	0.29	0.37	0.41
28	-0.26	-0.77	-0.90	-0.90	-0.83	-0.75	-0.61	-0.45	-0.37	-0.29	-0.11	-0.03	0.10	0.21	0.28	0.38	0.41	0.50
29	-0.41	-0.87	-0.81	-0.72	-0.61	-0.49	-0.38	-0.30	-0.21	-0.05	0.11	0.30	0.40	0.49	0.54	0.58	0.65	0.65
30	-0.45	-0.75	-0.64	-0.64	-0.47	-0.36	-0.34	-0.23	-0.03	0.17	0.34	0.46	0.52	0.59	0.65	0.70	0.70	0.71
31	-0.73	-0.76	-0.74	-0.59	-0.43	-0.36	-0.24	-0.03	0.09	0.27	0.39	0.50	0.57	0.61	0.67	0.70	0.70	0.68
32	-0.23	-0.59	-0.44	-0.32	-0.35	-0.29	-0.02	0.21	0.36	0.54	0.64	0.70	0.72	-0.04	-0.05	-0.03	-0.04	-0.06
33	0.11	-0.16	-0.09	-0.21	-0.21	0.04	0.19	0.32	0.47	0.61	0.70	0.75	0.01	0.03	0.03	0.01	0.01	0.03
34	-0.13	0.27	-0.03	-0.16	0.03	0.13	0.27	0.38	0.50	0.63	0.74	0.01	0.02	0.01	-0.01	0.00	-0.01	0.03
35	0.65	-0.06	-0.08	0.10	0.17	0.25	0.40	0.51	0.64	0.73	0.00	0.04	0.02	0.01	0.01	0.03	0.06	0.06
36	0.10	-0.21	-0.13	-0.09	0.09	0.20	0.33	0.41	0.54	0.70	-0.02	0.02	0.03	0.03	0.05	0.06	0.06	0.03

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 9: Fama & French Alphas Regressions with MKT market proxy - No size distinction - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.43	0.46	0.42	0.45	0.43	0.46	0.46	0.42	0.44	0.44	0.38	0.39	0.42	0.42	0.38	0.40	0.36	0.34
2	0.32	0.30	0.30	0.33	0.34	0.37	0.37	0.35	0.35	0.29	0.28	0.30	0.29	0.26	0.27	0.27	0.23	0.21
3	0.07	0.06	0.09	0.11	0.15	0.17	0.16	0.13	0.10	0.09	0.08	0.10	0.10	0.12	0.11	0.07	0.05	0.08
4	-0.01	0.00	0.01	0.05	0.08	0.07	0.06	0.01	-0.01	-0.02	-0.04	-0.03	0.00	0.01	-0.01	-0.03	0.00	0.01
5	0.05	0.05	0.08	0.11	0.13	0.10	0.07	0.03	0.03	0.02	0.00	0.03	0.04	0.03	0.00	0.03	0.05	0.09
6	-0.11	-0.10	-0.08	-0.07	-0.08	-0.09	-0.13	-0.16	-0.15	-0.15	-0.15	-0.13	-0.14	-0.15	-0.11	-0.09	-0.05	-0.01
7	0.08	0.08	0.07	0.06	0.04	0.02	-0.02	-0.03	-0.03	-0.04	-0.02	-0.02	-0.03	0.02	0.03	0.08	0.14	0.18
8	0.08	0.08	0.06	0.04	0.04	0.03	0.03	0.01	0.02	0.02	0.00	0.00	0.02	0.05	0.09	0.14	0.18	0.21
9	0.16	0.14	0.11	0.09	0.08	0.09	0.09	0.08	0.08	0.06	0.05	0.08	0.10	0.14	0.19	0.23	0.26	0.30
10	0.31	0.28	0.25	0.21	0.22	0.22	0.23	0.22	0.19	0.16	0.18	0.20	0.26	0.31	0.35	0.39	0.43	0.47
11	0.24	0.21	0.18	0.18	0.20	0.21	0.19	0.14	0.13	0.14	0.17	0.24	0.27	0.32	0.38	0.42	0.46	0.46
12	0.09	0.09	0.09	0.09	0.12	0.13	0.08	0.04	0.07	0.09	0.16	0.20	0.26	0.33	0.36	0.41	0.40	0.39
13	0.15	0.15	0.15	0.15	0.16	0.13	0.10	0.10	0.12	0.18	0.22	0.28	0.35	0.39	0.43	0.43	0.42	0.41
14	0.12	0.13	0.14	0.14	0.12	0.11	0.12	0.13	0.19	0.21	0.26	0.33	0.36	0.41	0.41	0.41	0.39	0.38
15	0.15	0.17	0.17	0.15	0.15	0.17	0.18	0.23	0.25	0.30	0.37	0.40	0.45	0.47	0.46	0.44	0.42	0.42
16	0.19	0.20	0.18	0.16	0.19	0.21	0.27	0.28	0.32	0.38	0.40	0.46	0.48	0.48	0.46	0.45	0.44	0.44
17	0.23	0.20	0.19	0.21	0.26	0.34	0.36	0.41	0.46	0.49	0.54	0.57	0.58	0.58	0.55	0.55	0.52	0.51
18	0.17	0.19	0.22	0.24	0.32	0.34	0.39	0.44	0.45	0.50	0.53	0.53	0.54	0.55	0.53	0.51	0.50	0.49
19	0.10	0.14	0.19	0.27	0.32	0.38	0.44	0.45	0.50	0.51	0.51	0.52	0.52	0.52	0.51	0.49	0.47	0.50
20	0.31	0.36	0.44	0.47	0.53	0.59	0.61	0.65	0.65	0.64	0.64	0.65	0.65	0.65	0.63	0.61	0.62	0.63
21	0.33	0.40	0.45	0.51	0.58	0.60	0.63	0.63	0.62	0.61	0.60	0.60	0.60	0.59	0.57	0.60	0.59	0.62
22	0.35	0.39	0.45	0.51	0.52	0.58	0.59	0.58	0.57	0.55	0.54	0.54	0.55	0.54	0.57	0.56	0.58	0.61
23	0.39	0.46	0.53	0.53	0.58	0.59	0.57	0.56	0.52	0.51	0.51	0.52	0.52	0.55	0.55	0.57	0.60	0.61
24	0.31	0.38	0.38	0.42	0.44	0.44	0.43	0.41	0.39	0.38	0.39	0.40	0.43	0.44	0.47	0.51	0.52	0.55
25	0.37	0.38	0.44	0.46	0.46	0.45	0.43	0.40	0.39	0.39	0.38	0.43	0.43	0.46	0.49	0.51	0.53	0.55
26	0.36	0.44	0.45	0.45	0.45	0.44	0.41	0.39	0.38	0.38	0.43	0.43	0.43	0.47	0.49	0.52	0.54	0.56
27	0.49	0.50	0.48	0.48	0.46	0.45	0.44	0.42	0.41	0.41	0.41	0.41	0.44	0.46	0.48	0.50	0.52	0.52
28	0.53	0.51	0.51	0.50	0.50	0.49	0.47	0.45	0.47	0.47	0.47	0.47	0.49	0.51	0.52	0.53	0.52	0.53
29	0.65	0.64	0.64	0.62	0.61	0.60	0.59	0.60	0.58	0.57	0.57	0.58	0.57	0.57	0.55	0.55	0.54	0.55
30	0.69	0.67	0.67	0.66	0.66	0.64	0.67	0.64	0.62	0.61	0.61	0.61	0.59	0.60	0.59	0.58	0.59	0.58
31	0.69	0.71	0.70	0.69	0.70	-0.08	-0.09	0.69	0.70	0.70	0.69	0.67	0.67	0.67	0.65	0.65	0.63	0.61
32	-0.05	-0.05	-0.07	-0.07	-0.04	-0.04	-0.06	-0.06	-0.06	-0.07	-0.09	-0.10	-0.11	-0.12	-0.12	-0.13	-0.16	0.65
33	0.05	0.03	0.02	0.07	0.07	0.06	0.04	0.00	-0.03	-0.06	-0.06	-0.06	-0.06	-0.07	-0.08	-0.10	-0.12	-0.16
34	0.04	0.02	0.03	0.03	0.04	0.05	0.03	-0.01	-0.05	-0.06	-0.07	-0.08	-0.07	-0.07	-0.09	-0.10	-0.14	-0.17
35	0.04	0.06	0.06	0.06	0.06	0.07	0.05	0.00	-0.02	-0.05	-0.07	-0.06	-0.06	-0.07	-0.07	-0.10	-0.13	-0.15
36	0.05	0.05	0.04	0.04	0.04	0.03	-0.01	-0.05	-0.08	-0.10	-0.09	-0.09	-0.10	-0.09	-0.12	-0.14	-0.17	-0.19

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Due to the large numbers of trading strategies tested in this study, the results above are limited to the significance of the alphas. To achieve a better understanding of the relationship between strategies and risk factors, four main strategies have been selected for closer analysis, taken from the most appealing areas of the Figure 2, the momentum area defined by strategies with $J \leq 12$ and $K \leq 12$ and the reversal area defined by strategies with $J \geq 22$ and $K \leq 18$. The four strategies are the two momentum strategies 2×2 and 2×3 and the two reversal strategies 28×3 and 28×4 . In order to facilitate the comparison between the momentum and reversal strategies, they are both shown in Figure 3 as if the trading strategy used in this work were inverted, meaning that, past losers entered the long portfolio and past winners the short portfolio. Thus, the alpha shown in Table 10 is exactly the opposite to the one displayed in Table 8 and for the interpretation of coefficients this must also take that into account.

Figure 3: Trading Strategies Nominal Indexes - No size distinction

The index display value 100 at the beginning of the return series for the strategies, 30/12/2004, and accumulates the nominal returns until the last day, 29/06/2012.

First of all, some comments about the dynamics of the strategies. From the Figure 3 it can be noted that the higher average nominal return obtained by the reversal strategies, is due, basically, to the financial crisis. Since our calculations do not separate strategies' returns between losers and winners, it is postulated that at first glance this result is probably due to past winners that suffered big losses during the crisis and secondly due to the recovery of the firms most affected by the crisis. Afterwards, reversal strategies accumulate a series of negative returns.

Looking at the exposure to risk factors, interesting results can be noted. Both strategies display a highly significant positive exposure to value risk. Fama & French (1996) regress momentum and reversal strategies on the three factor model and conclude that due to past losers, present higher loadings on SMB and HML factors and winners show the opposite pattern, exposure to risk of reversal strategies is positive and, thus, the factors can help to explain the strategy returns. For the exact opposite reason, momentum strategies cannot be explained by the model. This behavior is also observed by Rouwenhorst (1998) and Jegadeesh & Titman (2001), although the first only reports on the SMB loadings. What is seen for Brazil is that the results for reversal strategies are in line with the ones reported for international data, however for momentum strategies a different pattern becomes clear: their exposure to value risk are positive and highly significant. Therefore, it raises the possibility that it is in fact due to higher exposure to value risk that momentum strategies do not generate an abnormal performance as observed in the academic papers. In addition, all the international studies mentioned above report a virtually zero loading for the market risk in winner minus loser portfolios as well as the result found in this study. With regards to national literature, as far as we know, any other studies that have reviewed momentum or reversal effect have applied the Fama & French framework, so it is not possible to compare the unexpected results obtained here.

Table 10: Fama & French Regressions - No Size Distinction

	Alpha	MKT	SMB	HML
2×2				
Coefficients	0.0123	-0.0980	-0.2409	0.3459
P-Value	5.57%	44.60%	35.33%	1.21%
2×3				
Coefficients	0.0050	-0.0068	-0.0869	0.3154
P-Value	33.36%	95.42%	68.55%	1.69%
28×3				
Coefficients	0.0090	0.0652	0.3971	0.3993
P-Value	38.07%	68.90%	20.79%	1.41%
28×4				
Coefficients	0.0090	0.0547	0.4218	0.3994
P-Value	38.57%	72.82%	16.28%	1.23%

Note: The market proxy utilized in the regressions is MKT. Regressions use *OLS* method and standard errors are corrected by Newey-West with 1 lag.

3.4 Robustness

As explained in Subsection 3.3, MKT was adopted as the proxy for market risk since it was the only one of the three available proxies in this study to present a positive average nominal return. To evaluate whether the results obtained in the last two sections are limited to MKT proxy, all the 1296 Fama & French regressions are run for both the other proxies, IBOV and MSCI. Due to their size, the Tables are displayed only in the Appendix¹⁴. Comparing the Tables 31 to 34, it is clear that results are sustained for any proxy. Roughly the same patterns are maintained between the alpha strategies with absolute differences around 0.03%. Additionally, the statistical significance of alphas are basically the same with marginal changes.

¹⁴Appendix D: Robustness - Tables

3.5 Size

Since bigger stocks offer lower negotiation costs and are heavily traded, the existence of momentum and reversal effects in these stocks can be diminished or purged by the market participants. On the other hand, small stocks usually impose a prohibitive cost to forming the active trading strategies of momentum and reversal. Therefore, the results of momentum and reversal strategies in Section 3. can be magnified if the sample is divided in small and big stocks. There is additional criticism that states that reversal strategies can be explained due to higher exposure to size risk as addressed by Chan (1988) in that losers tend to be smaller than winners.

In order to analyze these possibilities, the eligible group of stocks to form zero-cost momentum and reversal portfolios is divided up by the median value of their firm's market capitalization at the end of the month. The median value of the firm's market capitalization for each month is considered in allocating stocks into two groups: big stocks and small stocks. So, stocks below the median are considered small stocks and above, big stocks. Then the same trading strategies applied in Section 3. are used for stocks in both size subsamples. This procedure is repeated for every month between December 2004 and June 2012.

3.5.1 Results

The monthly average nominal returns are shown for small stocks in Figure 4 and for big stocks in Figure 5. The first point that must be stressed is that with regard to the statistical significance of the strategies, almost all the results are virtually the same. All strategies for the big stock subsample have statistically average returns that equal zero and for the small stocks subsample only the strategies 3×1 and 2×2 generate abnormal returns. Therefore, the main result is that the lack of evidence for momentum and reversal effects stays the same, even for small stocks subsample. An additional consideration must be made. In order to avoid repetition about the lack of significance when the results are

compared between the original sample and the two subsamples in the paragraphs below, it should be remembered that although mathematically, the results are different, statistically they are roughly the same.

Comparing the results for small stocks with the sample without size distinction, a characteristic that is prominent is that the magnitudes of strategies' returns increase with the best strategies reaching nearly to 2% in absolute return, for momentum strategies as well as for reversal strategies. If the results of the reversal strategies are due to size risk exposure, when the samples are divided by the median size, the differences in exposure to size risk between stocks of the same group reduces. An implication would be that reversal strategies would have lower average nominal returns, but in fact the opposite happens, which suggests that the increase in magnitude of returns is due to a decrease in liquidity associated with higher costs of the small stocks. In addition, the higher returns for momentum strategies also support the hypothesis of greater trading costs. A second characteristic is that the short term reversal strategies with $13 \leq J \leq 21$ and $K \leq 18$ and with $J \geq 21$ and $K \leq 18$ become better defined around the 18 months and 30 months for formation period, respectively. This evidence seems to indicate a more intense reversal effect for stocks that have accumulated poor returns in the past 1.5 year and 2.5 years. The third point is that momentum strategies present basically the same pattern with minor changes between the relative profitability of the strategies.

Figure 4: Average Monthly Nominal Returns - Small Stocks

Small stocks are defined as the stocks from the eligible group whose firm's value is below the monthly median. The value of the bigger stocks is above the median. The monthly nominal returns of the 1296 strategies averaged between Jan/2005 and June/2012. The y-axis represents the number of months used to calculate the past cumulative return to rank the stocks, and the x-axis represents the number of months that the zero-cost portfolios will be maintained after the formation date.

Table 11: Average Nominal Return - Small Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.45	1.20	0.93	0.34	0.36	0.40	0.15	0.23	0.08	0.02	0.08	0.04	-0.06	-0.08	-0.13	-0.12	-0.18	-0.14
2	1.28	1.78	1.10	0.83	0.75	0.36	0.20	0.06	-0.08	-0.06	0.02	-0.12	-0.16	-0.28	-0.33	-0.29	-0.33	-0.30
3	2.22	1.30	1.15	0.58	0.50	0.23	-0.21	-0.28	-0.13	-0.26	-0.29	-0.41	-0.60	-0.59	-0.62	-0.56	-0.46	-0.51
4	0.85	0.38	-0.03	-0.35	-0.40	-0.76	-0.90	-0.81	-0.81	-0.90	-0.93	-1.05	-1.18	-1.24	-1.18	-1.10	-1.06	-1.06
5	1.66	0.90	0.29	0.11	-0.09	-0.31	-0.33	-0.29	-0.39	-0.47	-0.56	-0.72	-0.90	-0.99	-0.89	-0.85	-0.83	-0.80
6	1.15	-0.24	-0.65	-1.01	-1.06	-0.93	-0.98	-0.94	-0.99	-1.06	-1.11	-1.21	-1.35	-1.35	-1.29	-1.22	-1.17	-1.13
7	0.48	0.00	-0.45	-0.80	-0.59	-0.80	-1.00	-0.96	-0.99	-1.07	-1.16	-1.16	-1.24	-1.18	-1.10	-1.04	-0.97	-0.98
8	0.47	-0.32	-0.93	-0.78	-0.96	-1.12	-1.19	-1.18	-1.18	-1.25	-1.20	-1.21	-1.12	-1.12	-1.04	-1.00	-0.96	-0.90
9	0.19	-0.83	-0.90	-1.20	-1.39	-1.38	-1.30	-1.27	-1.39	-1.41	-1.34	-1.32	-1.32	-1.23	-1.14	-1.11	-1.09	-1.07
10	-0.10	-0.10	-0.41	-0.87	-1.13	-1.24	-1.20	-1.23	-1.26	-1.26	-1.07	-1.13	-1.06	-0.95	-0.94	-0.90	-0.89	-0.89
11	0.05	-0.40	-0.54	-0.85	-1.06	-1.11	-1.09	-1.05	-1.05	-0.94	-0.88	-0.91	-0.80	-0.77	-0.72	-0.67	-0.68	-0.69
12	-0.20	-0.42	-0.87	-1.18	-1.44	-1.46	-1.29	-1.26	-1.23	-1.20	-1.12	-1.05	-1.00	-0.96	-0.90	-0.87	-0.85	-0.87
13	-0.16	-0.92	-1.23	-1.45	-1.49	-1.43	-1.31	-1.12	-1.16	-1.16	-1.10	-1.06	-0.99	-0.94	-0.91	-0.89	-0.91	-0.86
14	-0.82	-1.29	-1.42	-1.51	-1.48	-1.41	-1.33	-1.34	-1.28	-1.22	-1.04	-0.98	-0.91	-0.85	-0.79	-0.79	-0.75	-0.74
15	-0.02	-0.91	-0.94	-1.18	-1.41	-1.42	-1.40	-1.39	-1.30	-1.25	-1.07	-1.01	-0.93	-0.86	-0.83	-0.77	-0.72	-0.70
16	-0.44	-1.13	-1.18	-1.53	-1.55	-1.57	-1.53	-1.48	-1.42	-1.32	-1.16	-1.05	-0.94	-0.90	-0.81	-0.74	-0.70	-0.63
17	-0.83	-1.19	-1.53	-1.67	-1.71	-1.63	-1.54	-1.37	-1.31	-1.18	-1.03	-0.89	-0.81	-0.74	-0.74	-0.69	-0.62	-0.55
18	-0.53	-1.51	-1.70	-1.69	-1.68	-1.63	-1.55	-1.48	-1.45	-1.25	-1.12	-0.96	-0.90	-0.86	-0.81	-0.75	-0.64	-0.55
19	-0.73	-1.49	-1.32	-1.39	-1.33	-1.40	-1.43	-1.38	-1.25	-1.11	-1.01	-0.88	-0.84	-0.81	-0.74	-0.62	-0.52	-0.43
20	-0.36	-1.19	-1.00	-1.01	-1.16	-1.28	-1.26	-1.06	-0.88	-0.77	-0.63	-0.54	-0.50	-0.43	-0.38	-0.30	-0.26	-0.23
21	-0.40	-0.89	-1.01	-1.10	-1.16	-1.28	-1.29	-1.12	-1.19	-1.06	-0.92	-0.84	-0.75	-0.61	-0.51	-0.44	-0.42	-0.35
22	-0.05	-0.42	-0.57	-0.79	-0.96	-1.11	-1.21	-1.10	-0.97	-0.85	-0.78	-0.74	-0.67	-0.55	-0.53	-0.48	-0.36	-0.27
23	0.49	-0.35	-0.52	-0.90	-1.06	-1.19	-1.31	-1.20	-1.24	-1.14	-0.98	-0.90	-0.78	-0.76	-0.72	-0.57	-0.44	-0.39
24	0.07	-0.34	-0.88	-1.34	-1.23	-1.33	-1.38	-1.31	-1.30	-1.20	-0.98	-0.93	-0.93	-0.89	-0.79	-0.65	-0.54	-0.45
25	0.06	-0.84	-1.29	-1.53	-1.75	-1.84	-1.86	-1.83	-1.70	-1.39	-1.15	-1.10	-1.08	-0.92	-0.79	-0.67	-0.58	-0.56
26	-0.65	-1.36	-1.70	-2.00	-2.04	-2.04	-2.05	-1.98	-1.77	-1.48	-1.36	-1.26	-1.07	-0.93	-0.81	-0.69	-0.61	-0.59
27	-0.68	-1.47	-1.90	-2.21	-2.17	-2.15	-2.08	-1.75	-1.56	-1.39	-1.24	-1.03	-0.85	-0.72	-0.59	-0.46	-0.41	-0.38
28	-1.03	-1.72	-1.90	-2.23	-2.25	-2.17	-2.08	-1.73	-1.48	-1.32	-1.11	-0.89	-0.73	-0.58	-0.42	-0.36	-0.32	-0.28
29	-1.66	-1.75	-1.96	-2.02	-2.06	-2.02	-1.90	-1.80	-1.58	-1.28	-1.01	-0.82	-0.63	-0.50	-0.44	-0.39	-0.34	-0.33
30	-0.53	-1.42	-1.67	-1.79	-1.75	-1.75	-1.70	-1.49	-1.15	-0.83	-0.67	-0.50	-0.34	-0.30	-0.22	-0.14	-0.15	-0.17
31	-1.07	-1.74	-1.86	-1.81	-1.70	-1.84	-1.76	-1.36	-1.15	-0.95	-0.68	-0.47	-0.38	-0.29	-0.23	-0.20	-0.22	-0.28
32	-1.90	-1.89	-1.83	-1.87	-1.93	-1.94	-1.42	-1.02	-0.79	-0.51	-0.29	-0.11	-0.07	-0.01	0.01	0.01	-0.05	-0.06
33	-1.58	-1.16	-1.35	-1.67	-1.66	-1.30	-1.05	-0.85	-0.57	-0.32	-0.14	-0.04	0.02	0.07	0.07	0.10	0.11	0.13
34	-0.87	-1.41	-1.99	-2.13	-1.52	-1.33	-1.10	-0.79	-0.47	-0.29	-0.08	0.05	0.08	0.07	0.06	0.06	0.08	0.14
35	-1.26	-1.96	-2.29	-1.93	-1.62	-1.36	-0.99	-0.68	-0.45	-0.23	-0.09	-0.01	-0.01	-0.05	-0.05	-0.01	0.02	0.02
36	-1.89	-2.32	-2.09	-1.89	-1.39	-0.97	-0.65	-0.42	-0.17	-0.06	0.05	0.08	0.04	0.03	0.04	0.06	0.02	0.02

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the nominal returns considers standard errors corrected by Newey-West with 1 lag.

Table 12: Average Nominal Return - Small Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	-0.15	-0.10	-0.17	-0.10	-0.11	-0.11	-0.06	-0.09	-0.05	-0.05	-0.14	-0.13	-0.09	-0.05	-0.12	-0.11	-0.14	-0.19
2	-0.31	-0.33	-0.34	-0.30	-0.29	-0.24	-0.27	-0.26	-0.23	-0.25	-0.24	-0.17	-0.14	-0.17	-0.18	-0.18	-0.27	-0.30
3	-0.53	-0.51	-0.49	-0.47	-0.45	-0.40	-0.45	-0.42	-0.42	-0.40	-0.42	-0.40	-0.42	-0.40	-0.43	-0.50	-0.54	-0.51
4	-1.06	-1.04	-1.02	-0.98	-0.97	-0.91	-0.91	-0.93	-0.93	-0.91	-0.93	-0.92	-0.87	-0.86	-0.93	-0.97	-0.93	-0.90
5	-0.77	-0.79	-0.77	-0.79	-0.79	-0.73	-0.75	-0.78	-0.75	-0.76	-0.79	-0.72	-0.69	-0.73	-0.77	-0.73	-0.71	-0.64
6	-1.11	-1.11	-1.10	-1.10	-1.11	-1.10	-1.10	-1.10	-1.05	-1.05	-1.02	-0.97	-1.01	-1.02	-1.00	-0.96	-0.88	-0.80
7	-0.96	-0.99	-1.00	-1.02	-1.02	-1.01	-1.01	-0.98	-0.93	-0.87	-0.84	-0.87	-0.89	-0.87	-0.83	-0.74	-0.65	-0.58
8	-0.89	-0.88	-0.88	-0.91	-0.92	-0.93	-0.90	-0.87	-0.83	-0.79	-0.85	-0.86	-0.84	-0.82	-0.74	-0.64	-0.59	-0.52
9	-1.00	-0.97	-0.99	-1.01	-1.00	-0.93	-0.91	-0.88	-0.84	-0.89	-0.92	-0.88	-0.87	-0.79	-0.75	-0.69	-0.62	-0.54
10	-0.86	-0.86	-0.87	-0.88	-0.79	-0.76	-0.75	-0.72	-0.75	-0.77	-0.75	-0.71	-0.65	-0.60	-0.53	-0.45	-0.38	-0.32
11	-0.68	-0.68	-0.69	-0.67	-0.60	-0.59	-0.59	-0.59	-0.60	-0.57	-0.53	-0.44	-0.41	-0.37	-0.31	-0.24	-0.18	-0.16
12	-0.84	-0.82	-0.75	-0.72	-0.67	-0.65	-0.69	-0.74	-0.70	-0.66	-0.57	-0.50	-0.44	-0.37	-0.33	-0.24	-0.26	-0.29
13	-0.82	-0.79	-0.74	-0.69	-0.63	-0.61	-0.64	-0.63	-0.58	-0.54	-0.49	-0.37	-0.30	-0.29	-0.22	-0.21	-0.24	-0.25
14	-0.71	-0.66	-0.59	-0.57	-0.52	-0.55	-0.52	-0.46	-0.39	-0.38	-0.36	-0.28	-0.24	-0.15	-0.14	-0.17	-0.22	-0.25
15	-0.66	-0.59	-0.54	-0.53	-0.54	-0.51	-0.48	-0.38	-0.37	-0.36	-0.29	-0.24	-0.18	-0.14	-0.16	-0.20	-0.25	-0.28
16	-0.57	-0.49	-0.48	-0.47	-0.41	-0.38	-0.27	-0.27	-0.22	-0.18	-0.15	-0.05	-0.03	-0.01	-0.03	-0.06	-0.09	-0.09
17	-0.49	-0.42	-0.38	-0.32	-0.25	-0.14	-0.11	-0.06	-0.02	-0.02	0.06	0.11	0.12	0.13	0.12	0.08	0.03	0.00
18	-0.47	-0.45	-0.37	-0.31	-0.17	-0.14	-0.09	-0.04	-0.04	0.02	0.05	0.08	0.08	0.09	0.06	0.03	-0.01	-0.02
19	-0.38	-0.32	-0.25	-0.13	-0.05	0.03	0.08	0.06	0.10	0.08	0.09	0.11	0.10	0.11	0.10	0.07	0.03	0.07
20	-0.17	-0.09	0.02	0.08	0.16	0.23	0.21	0.25	0.24	0.20	0.21	0.22	0.21	0.21	0.20	0.18	0.19	0.18
21	-0.29	-0.18	-0.10	-0.03	0.05	0.04	0.08	0.07	0.05	0.03	0.03	0.04	0.03	0.05	0.05	0.07	0.05	0.08
22	-0.16	-0.09	0.02	0.08	0.08	0.13	0.12	0.09	0.07	0.05	0.04	0.04	0.05	0.05	0.09	0.09	0.12	0.19
23	-0.32	-0.22	-0.11	-0.07	0.01	0.01	-0.05	-0.08	-0.12	-0.14	-0.14	-0.12	-0.12	-0.05	-0.04	0.00	0.04	0.09
24	-0.43	-0.32	-0.29	-0.21	-0.18	-0.23	-0.27	-0.31	-0.35	-0.35	-0.33	-0.31	-0.25	-0.22	-0.20	-0.14	-0.11	-0.06
25	-0.48	-0.43	-0.39	-0.38	-0.38	-0.42	-0.44	-0.49	-0.49	-0.47	-0.46	-0.37	-0.36	-0.34	-0.29	-0.25	-0.23	-0.17
26	-0.57	-0.52	-0.51	-0.51	-0.51	-0.53	-0.56	-0.57	-0.57	-0.57	-0.54	-0.51	-0.52	-0.48	-0.45	-0.41	-0.38	-0.30
27	-0.29	-0.30	-0.31	-0.33	-0.35	-0.39	-0.41	-0.43	-0.44	-0.42	-0.39	-0.36	-0.35	-0.32	-0.28	-0.25	-0.20	-0.18
28	-0.29	-0.30	-0.31	-0.31	-0.31	-0.32	-0.36	-0.38	-0.34	-0.31	-0.29	-0.27	-0.25	-0.25	-0.22	-0.18	-0.18	-0.16
29	-0.32	-0.34	-0.34	-0.31	-0.30	-0.31	-0.32	-0.28	-0.27	-0.27	-0.26	-0.25	-0.23	-0.23	-0.21	-0.19	-0.20	-0.16
30	-0.17	-0.17	-0.19	-0.17	-0.19	-0.21	-0.16	-0.19	-0.20	-0.21	-0.19	-0.18	-0.20	-0.18	-0.16	-0.17	-0.16	-0.18
31	-0.28	-0.25	-0.22	-0.23	-0.24	-0.17	-0.17	-0.18	-0.15	-0.12	-0.12	-0.14	-0.12	-0.11	-0.13	-0.10	-0.13	-0.15
32	-0.07	-0.07	-0.08	-0.07	-0.03	-0.04	-0.07	-0.06	-0.04	-0.04	-0.04	0.00	0.01	0.01	0.04	0.04	-0.01	-0.02
33	0.15	0.10	0.07	0.14	0.15	0.19	0.21	0.18	0.22	0.23	0.25	0.25	0.25	0.26	0.22	0.19	0.16	0.14
34	0.09	0.08	0.08	0.11	0.11	0.18	0.19	0.22	0.23	0.23	0.22	0.22	0.23	0.24	0.22	0.20	0.14	0.13
35	0.01	0.03	0.03	0.05	0.07	0.10	0.07	0.05	0.06	0.05	0.05	0.05	0.06	0.07	0.07	0.04	0.02	0.00
36	0.09	0.12	0.07	0.10	0.12	0.11	0.08	0.03	0.02	0.03	0.03	0.03	0.04	0.04	0.01	0.02	-0.01	-0.05

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the nominal returns considers standard errors corrected by Newey-West with 1 lag.

The results for the big stocks subsample differ more than for small stocks when compared to the results of the sample with no size distinction. Contrary to what is observed with small stocks, the average returns for all strategies decrease in magnitude. It can be seen through the scale of the heat map in Figure 5 that the momentum strategy with the maximum profitability does not reach 1% per month and reversal strategies are slightly higher than 1% per month in magnitude. Despite the fact that the strategies between this work and Jegadeesh & Titman (1993) are different, the authors also report a reduced return for the zero-cost portfolios, winner minus loser portfolios, of around 0.75%.

Additionally, two remarkable patterns arise for momentum strategies. First, for big stocks a reversal behavior appears between consecutive months, that is, firms with extreme performances in the previous month tend to present a contrary performance in the following month. This reversal strategy gained 0.97% per month, although it is statistically insignificant with a p-value of around 16.62%. Second, the number of momentum strategies with a formation period shorter than one year, $J \leq 12$, and holding period shorter than one year, $K \leq 12$ increases. This shift is very interesting since it is aligned with the evidence reported in Jegadeesh & Titman (1993), Jegadeesh & Titman (2001) and Rouwenhorst (1998).

With regard to reversal strategies, the region defined by strategies with $13 \leq J \leq 21$ and $K \leq 18$ have weakened profitability, presenting, indeed, some positive returns. Nevertheless, the other reversal area defined by strategies with $13 \leq J \leq 21$ and $K \leq 18$, still shows the reversal pattern to be robust to changes in sample size, although slightly weaker. Despite the fact that the results are statistically insignificant, the evidence provided by reversal strategies for this area are in accordance with results in Bonomo & Dall'Agnol (2003), which report that the magnitude of reversal strategies diminish only by 0.4% when the effect of size is neutralized from loser minus winner portfolios. In contrast Saturnino et al. (2012) reports that the reversal pattern is not observed for big stocks, but only for small stocks.

Figure 5: Average Monthly Nominal Returns - Big Stocks

Small stocks are defined as company stocks from the eligible group whose value is below the monthly median. The bigger stocks are defined as those whose value is above the median. Average monthly nominal returns of the 1296 strategies between Jan/2005 until 2012. The y-axis represents the number of months used to calculate the past cumulative return that is used to rank stocks and the x-axis represents the number of months that the zero-cost portfolios will be maintained after the formation date.

Table 13: Average Nominal Return - Big Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.97	-0.27	-0.12	-0.12	0.18	0.20	0.12	0.14	0.07	0.15	0.28	0.21	0.16	0.18	0.13	0.14	0.10	0.16
2	0.16	0.44	0.37	0.42	0.46	0.41	0.30	0.21	0.23	0.29	0.32	0.32	0.25	0.21	0.18	0.12	0.09	0.12
3	0.29	0.27	0.42	0.44	0.60	0.47	0.34	0.30	0.33	0.32	0.31	0.27	0.19	0.13	0.08	0.07	0.06	0.06
4	-0.15	0.15	0.34	0.38	0.52	0.42	0.34	0.31	0.26	0.30	0.31	0.22	0.16	0.10	0.09	0.08	0.05	0.09
5	0.40	0.63	0.70	0.60	0.60	0.52	0.45	0.42	0.39	0.42	0.39	0.31	0.21	0.17	0.15	0.10	0.09	0.12
6	0.65	0.72	0.70	0.49	0.54	0.51	0.43	0.39	0.32	0.31	0.31	0.20	0.17	0.17	0.11	0.11	0.11	0.16
7	0.88	0.72	0.65	0.55	0.63	0.50	0.44	0.36	0.32	0.30	0.25	0.21	0.15	0.11	0.08	0.09	0.09	0.12
8	0.59	0.29	0.37	0.35	0.41	0.32	0.20	0.13	0.11	0.09	0.16	0.11	0.00	-0.02	-0.05	-0.01	0.00	0.03
9	0.10	-0.03	0.08	0.17	0.20	0.10	0.00	-0.05	-0.06	-0.02	0.00	-0.09	-0.13	-0.15	-0.14	-0.11	-0.07	-0.02
10	0.04	0.10	0.14	0.12	0.14	-0.04	-0.17	-0.24	-0.13	-0.12	-0.17	-0.22	-0.24	-0.20	-0.19	-0.13	-0.12	-0.10
11	0.06	0.03	0.02	-0.03	-0.06	-0.16	-0.22	-0.13	-0.07	-0.11	-0.13	-0.14	-0.13	-0.11	-0.08	-0.04	-0.02	-0.02
12	-0.04	-0.14	-0.11	-0.20	-0.21	-0.34	-0.32	-0.25	-0.24	-0.25	-0.26	-0.24	-0.23	-0.20	-0.19	-0.15	-0.12	-0.13
13	-0.25	-0.20	-0.14	-0.22	-0.22	-0.18	-0.20	-0.22	-0.24	-0.25	-0.24	-0.23	-0.21	-0.18	-0.15	-0.10	-0.08	-0.11
14	-0.09	-0.31	-0.31	-0.36	-0.21	-0.21	-0.30	-0.36	-0.38	-0.36	-0.34	-0.32	-0.30	-0.28	-0.25	-0.22	-0.21	-0.24
15	-0.25	-0.39	-0.43	-0.25	-0.19	-0.24	-0.34	-0.32	-0.27	-0.25	-0.24	-0.23	-0.20	-0.17	-0.17	-0.17	-0.19	-0.19
16	-0.66	-0.64	-0.44	-0.32	-0.27	-0.31	-0.40	-0.33	-0.32	-0.31	-0.26	-0.25	-0.23	-0.22	-0.22	-0.23	-0.23	-0.26
17	-0.80	-0.54	-0.34	-0.37	-0.33	-0.43	-0.42	-0.39	-0.36	-0.30	-0.27	-0.26	-0.25	-0.24	-0.26	-0.29	-0.31	-0.32
18	-0.77	-0.56	-0.47	-0.50	-0.50	-0.54	-0.53	-0.46	-0.41	-0.36	-0.32	-0.31	-0.30	-0.31	-0.33	-0.38	-0.39	-0.40
19	-0.75	-0.63	-0.52	-0.60	-0.55	-0.56	-0.54	-0.45	-0.41	-0.37	-0.34	-0.33	-0.32	-0.33	-0.34	-0.37	-0.38	-0.39
20	-0.85	-0.70	-0.73	-0.68	-0.67	-0.65	-0.59	-0.53	-0.47	-0.43	-0.39	-0.40	-0.39	-0.38	-0.39	-0.41	-0.42	-0.42
21	-0.75	-0.64	-0.57	-0.55	-0.49	-0.53	-0.48	-0.47	-0.43	-0.43	-0.41	-0.39	-0.39	-0.40	-0.39	-0.42	-0.40	-0.40
22	-0.74	-0.66	-0.59	-0.63	-0.56	-0.59	-0.59	-0.57	-0.55	-0.53	-0.46	-0.45	-0.45	-0.47	-0.49	-0.49	-0.49	-0.49
23	-0.52	-0.48	-0.54	-0.58	-0.50	-0.57	-0.61	-0.60	-0.56	-0.52	-0.51	-0.47	-0.47	-0.49	-0.49	-0.49	-0.51	-0.51
24	-0.23	-0.25	-0.39	-0.48	-0.47	-0.59	-0.61	-0.63	-0.58	-0.56	-0.53	-0.53	-0.52	-0.52	-0.51	-0.53	-0.54	-0.54
25	-0.44	-0.58	-0.58	-0.63	-0.60	-0.68	-0.67	-0.67	-0.62	-0.60	-0.60	-0.57	-0.52	-0.50	-0.51	-0.52	-0.53	-0.53
26	-0.77	-0.61	-0.65	-0.72	-0.71	-0.70	-0.68	-0.68	-0.66	-0.64	-0.62	-0.60	-0.54	-0.54	-0.56	-0.58	-0.58	-0.55
27	-0.55	-0.65	-0.72	-0.84	-0.78	-0.78	-0.77	-0.75	-0.74	-0.72	-0.69	-0.65	-0.60	-0.61	-0.60	-0.58	-0.56	-0.56
28	-1.01	-0.86	-0.95	-0.96	-0.87	-0.84	-0.84	-0.80	-0.78	-0.69	-0.63	-0.60	-0.57	-0.57	-0.55	-0.53	-0.54	-0.52
29	-0.70	-0.84	-0.90	-0.86	-0.84	-0.85	-0.83	-0.84	-0.75	-0.69	-0.65	-0.62	-0.59	-0.55	-0.53	-0.53	-0.52	-0.51
30	-0.99	-0.89	-0.82	-0.86	-0.86	-0.86	-0.85	-0.79	-0.71	-0.67	-0.63	-0.60	-0.55	-0.52	-0.49	-0.49	-0.48	-0.46
31	-0.86	-0.94	-0.92	-0.99	-0.98	-0.99	-0.86	-0.79	-0.72	-0.67	-0.64	-0.57	-0.52	-0.50	-0.47	-0.47	-0.44	-0.41
32	-1.19	-1.10	-0.98	-0.94	-0.91	-0.81	-0.76	-0.72	-0.65	-0.62	-0.55	-0.48	-0.43	-0.39	-0.36	-0.35	-0.31	-0.28
33	-1.06	-1.00	-0.88	-0.87	-0.78	-0.76	-0.73	-0.70	-0.68	-0.60	-0.51	-0.45	-0.41	-0.39	-0.35	-0.31	-0.28	-0.26
34	-0.48	-0.64	-0.63	-0.60	-0.55	-0.57	-0.57	-0.56	-0.49	-0.41	-0.34	-0.30	-0.26	-0.23	-0.19	-0.18	-0.16	-0.17
35	-0.80	-0.72	-0.58	-0.55	-0.56	-0.56	-0.61	-0.54	-0.41	-0.36	-0.30	-0.25	-0.20	-0.16	-0.12	-0.10	-0.10	-0.11
36	-0.63	-0.49	-0.55	-0.54	-0.53	-0.56	-0.55	-0.44	-0.31	-0.26	-0.20	-0.15	-0.09	-0.08	-0.04	-0.06	-0.05	-0.05

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the nominal returns considers standard errors corrected by Newey-West with 1 lag.

Table 14: Average Nominal Return - Big Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.16	0.11	0.11	0.14	0.14	0.16	0.17	0.14	0.12	0.08	0.06	0.01	0.02	0.01	-0.01	0.00	-0.01	0.00
2	0.09	0.05	0.05	0.07	0.11	0.13	0.12	0.08	0.03	-0.01	-0.04	-0.06	-0.08	-0.10	-0.08	-0.08	-0.05	-0.05
3	0.03	0.02	0.05	0.07	0.10	0.12	0.11	0.06	0.00	-0.06	-0.09	-0.10	-0.12	-0.11	-0.11	-0.10	-0.08	-0.06
4	0.06	0.05	0.07	0.13	0.15	0.14	0.09	0.00	-0.05	-0.09	-0.13	-0.16	-0.17	-0.17	-0.16	-0.14	-0.12	-0.10
5	0.14	0.11	0.15	0.19	0.21	0.18	0.12	0.04	-0.02	-0.07	-0.12	-0.15	-0.17	-0.16	-0.15	-0.14	-0.12	-0.12
6	0.13	0.12	0.14	0.15	0.13	0.08	0.03	-0.04	-0.09	-0.15	-0.17	-0.19	-0.20	-0.18	-0.19	-0.19	-0.19	-0.19
7	0.11	0.08	0.08	0.07	0.03	-0.03	-0.09	-0.16	-0.22	-0.24	-0.26	-0.28	-0.28	-0.28	-0.29	-0.29	-0.30	-0.28
8	0.05	0.02	0.01	-0.01	-0.02	-0.06	-0.12	-0.17	-0.21	-0.24	-0.25	-0.28	-0.28	-0.29	-0.29	-0.29	-0.28	-0.25
9	-0.01	-0.04	-0.08	-0.10	-0.14	-0.17	-0.23	-0.27	-0.32	-0.36	-0.37	-0.37	-0.37	-0.37	-0.38	-0.36	-0.33	-0.30
10	-0.10	-0.16	-0.18	-0.22	-0.26	-0.30	-0.33	-0.37	-0.41	-0.44	-0.44	-0.45	-0.44	-0.44	-0.45	-0.43	-0.40	-0.36
11	-0.03	-0.08	-0.12	-0.16	-0.20	-0.23	-0.27	-0.31	-0.35	-0.38	-0.40	-0.41	-0.41	-0.40	-0.39	-0.37	-0.33	-0.30
12	-0.15	-0.20	-0.23	-0.27	-0.28	-0.31	-0.34	-0.38	-0.42	-0.44	-0.46	-0.47	-0.47	-0.45	-0.43	-0.39	-0.36	-0.32
13	-0.13	-0.17	-0.21	-0.23	-0.25	-0.28	-0.31	-0.37	-0.40	-0.43	-0.45	-0.46	-0.44	-0.42	-0.39	-0.36	-0.33	-0.30
14	-0.25	-0.29	-0.31	-0.34	-0.35	-0.37	-0.40	-0.45	-0.47	-0.48	-0.49	-0.48	-0.45	-0.42	-0.41	-0.38	-0.35	-0.32
15	-0.20	-0.26	-0.29	-0.32	-0.34	-0.36	-0.39	-0.42	-0.44	-0.44	-0.44	-0.43	-0.41	-0.39	-0.37	-0.35	-0.32	-0.29
16	-0.29	-0.32	-0.34	-0.36	-0.39	-0.40	-0.42	-0.45	-0.46	-0.45	-0.44	-0.42	-0.40	-0.38	-0.36	-0.34	-0.31	-0.28
17	-0.33	-0.37	-0.39	-0.41	-0.42	-0.45	-0.47	-0.48	-0.47	-0.46	-0.44	-0.43	-0.41	-0.39	-0.37	-0.34	-0.31	-0.30
18	-0.41	-0.43	-0.45	-0.47	-0.51	-0.52	-0.53	-0.53	-0.52	-0.50	-0.48	-0.48	-0.45	-0.42	-0.40	-0.37	-0.35	-0.34
19	-0.41	-0.45	-0.47	-0.49	-0.52	-0.52	-0.52	-0.50	-0.50	-0.48	-0.45	-0.45	-0.43	-0.40	-0.38	-0.38	-0.35	-0.33
20	-0.42	-0.44	-0.47	-0.49	-0.50	-0.49	-0.47	-0.46	-0.46	-0.44	-0.42	-0.41	-0.38	-0.37	-0.36	-0.36	-0.33	-0.31
21	-0.40	-0.44	-0.47	-0.48	-0.47	-0.46	-0.45	-0.45	-0.44	-0.42	-0.39	-0.37	-0.36	-0.35	-0.34	-0.34	-0.32	-0.30
22	-0.48	-0.50	-0.52	-0.51	-0.49	-0.47	-0.45	-0.43	-0.41	-0.40	-0.36	-0.36	-0.35	-0.34	-0.33	-0.32	-0.30	-0.28
23	-0.53	-0.54	-0.53	-0.53	-0.52	-0.49	-0.47	-0.45	-0.43	-0.41	-0.40	-0.40	-0.39	-0.39	-0.39	-0.37	-0.34	-0.32
24	-0.54	-0.52	-0.51	-0.49	-0.46	-0.42	-0.39	-0.37	-0.37	-0.35	-0.33	-0.33	-0.32	-0.31	-0.30	-0.28	-0.25	-0.24
25	-0.52	-0.51	-0.49	-0.46	-0.43	-0.40	-0.38	-0.37	-0.37	-0.36	-0.34	-0.33	-0.33	-0.32	-0.32	-0.30	-0.27	-0.26
26	-0.54	-0.52	-0.50	-0.48	-0.46	-0.44	-0.43	-0.41	-0.40	-0.38	-0.37	-0.37	-0.35	-0.34	-0.32	-0.30	-0.27	-0.25
27	-0.53	-0.51	-0.47	-0.44	-0.43	-0.40	-0.40	-0.38	-0.37	-0.35	-0.34	-0.33	-0.32	-0.30	-0.29	-0.27	-0.23	-0.22
28	-0.50	-0.48	-0.45	-0.44	-0.42	-0.41	-0.40	-0.40	-0.40	-0.40	-0.38	-0.38	-0.36	-0.33	-0.33	-0.31	-0.29	-0.26
29	-0.49	-0.45	-0.43	-0.42	-0.40	-0.38	-0.38	-0.38	-0.38	-0.38	-0.38	-0.36	-0.34	-0.33	-0.32	-0.30	-0.27	-0.25
30	-0.43	-0.39	-0.38	-0.38	-0.37	-0.36	-0.36	-0.36	-0.37	-0.37	-0.36	-0.35	-0.35	-0.33	-0.32	-0.30	-0.26	-0.24
31	-0.38	-0.36	-0.35	-0.34	-0.32	-0.31	-0.31	-0.31	-0.31	-0.30	-0.30	-0.29	-0.28	-0.27	-0.24	-0.23	-0.21	-0.18
32	-0.25	-0.25	-0.26	-0.24	-0.24	-0.24	-0.24	-0.25	-0.27	-0.26	-0.27	-0.26	-0.24	-0.23	-0.22	-0.20	-0.18	-0.17
33	-0.24	-0.24	-0.24	-0.23	-0.23	-0.22	-0.25	-0.25	-0.25	-0.25	-0.24	-0.22	-0.21	-0.20	-0.18	-0.16	-0.15	-0.14
34	-0.18	-0.20	-0.20	-0.20	-0.19	-0.19	-0.20	-0.21	-0.22	-0.22	-0.21	-0.21	-0.21	-0.20	-0.18	-0.18	-0.16	-0.15
35	-0.11	-0.14	-0.15	-0.14	-0.16	-0.16	-0.18	-0.20	-0.19	-0.18	-0.18	-0.18	-0.17	-0.16	-0.15	-0.15	-0.14	-0.12
36	-0.08	-0.10	-0.10	-0.12	-0.14	-0.15	-0.15	-0.17	-0.15	-0.15	-0.14	-0.14	-0.13	-0.12	-0.12	-0.12	-0.11	-0.09

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly nominal returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the nominal returns considers standard errors corrected by Newey-West with 1 lag.

3.5.2 Seasonality

For momentum strategies the seasonality pattern found for the sample with no size distinction is repeated for small stocks but not for big stocks. In line with the results in Figure 4 and 5 which show that big stocks display lower returns for momentum strategies and, in addition, display a different arrangement between short term strategies, this seasonality pattern suggests that the short term momentum strategies are dominated by small stocks. The same happens for reversal strategies which manifest an increase in returns in November for all the three reversal areas when all the stocks in the sample are taken into consideration and the same pattern is only verified for small stocks. Therefore we observe that seasonality is predominantly relevant to small stocks and any confirmations of observations made for the whole sample are shown in the big stocks subsample.

Table 15: Seasonality Pattern of Last Decile - Nominal Returns - Small Stocks

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Momentum Strategies												
Coefficients	-2.60	2.23	-1.72	-0.65	1.13	6.37	1.64	2.62	2.29	3.68	0.80	8.58
P-Value	30.88	38.47	50.11	79.92	65.94	1.32	54.90	33.79	40.21	17.92	77.05	0.17
Reversal Strategies (Short Run1)												
Coefficients	-3.89	2.79	4.10	-6.77	0.70	3.43	-4.12	0.64	-3.85	1.67	-9.29	-8.12
P-Value	23.41	39.39	21.01	3.85	83.07	29.73	23.77	85.53	27.09	63.34	0.79	1.99
Reversal Strategies (Short Run2)												
Coefficients	-4.92	3.28	1.11	5.64	1.82	3.34	-0.83	2.19	-5.04	-0.11	-11.67	-5.65
P-Value	7.30	23.21	68.62	3.95	50.77	22.68	77.66	45.48	8.58	96.89	0.01	5.40
Reversal Strategies (Long Run)												
Coefficients	-0.24	1.31	1.32	0.08	-1.47	-0.22	-1.50	-0.10	-0.21	0.97	-5.29	-0.21
P-Value	82.13	22.18	21.77	94.00	16.76	83.78	18.90	92.91	85.14	39.48	0.00	85.25

Note: The values above are expressed in percentage numbers. Momentum Strategies are defined by the strategies with indexes $J \leq 12$ and $K \leq 12$, Reversal Strategies (Short Run1) by $13 \leq J \leq 21$ and $K \leq 18$, Reversal Strategies (Short Run2) by $J \geq 22$ and $K \leq 18$ and Reversal Strategies (Long Run) by $J \leq 12$ and $K \geq 13$.

Table 16: Seasonality Pattern of Last Decile - Nominal Returns - Big Stocks

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Momentum Strategies												
Coefficients	-1.72	0.05	1.07	-2.57	0.16	2.26	0.58	-1.16	-0.22	3.95	5.28	-1.39
P-Value	33.52	97.92	55.02	14.97	92.90	20.69	76.25	54.27	90.89	3.82	0.56	46.61
Reversal Strategies (Short Run1)												
Coefficients	-1.61	-0.88	1.15	-2.15	1.18	-0.15	-1.37	-0.16	0.50	0.75	0.00	-3.64
P-Value	34.57	60.48	50.21	20.67	48.82	93.20	45.31	93.17	78.22	68.18	99.82	4.61
Reversal Strategies (Short Run2)												
Coefficients	-0.65	0.40	0.67	-2.12	1.84	-1.56	-2.29	-2.30	1.50	-1.08	1.54	-2.43
P-Value	64.50	77.88	63.44	13.34	19.46	27.82	12.96	12.91	32.07	47.56	30.74	10.75
Reversal Strategies (Long Run)												
Coefficients	0.91	-0.57	0.63	-0.91	0.42	-0.65	0.57	-1.65	0.52	-1.25	-0.06	-1.08
P-Value	28.64	51.01	46.17	28.65	62.66	45.20	53.11	7.24	56.97	17.42	95.01	23.90

(continue)

Table 16: Seasonality Pattern of Last Decile - Nominal Returns - Big Stocks

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Note: The values above are expressed in percentage numbers. Momentum Strategies are defined by the strategies with indexes $J \leq 12$ and $K \leq 12$, Reversal Strategies (Short Run1) by $13 \leq J \leq 21$ and $K \leq 18$, Reversal Strategies (Short Run2) by $J \geq 22$ and $K \leq 18$ and Reversal Strategies (Long Run) by $J \leq 12$ and $K \geq 13$.												

3.5.3 Risk Adjusted

Again the same question concerning whether strategies' returns are driven by compensation for risk can be asked. Once more, the analyses of alphas in the Fama & French framework can provide some informative tests for such a theory. For the same reason as that explained in Subsection 3.3, the MKT is selected to be the proxy of market risk. Despite the larger returns for strategies in the small stocks sample, in Tables 18 and 19, it is possible to see that the returns are still explained by the loadings in Fama & French risk factors.

In Table 17 the coefficients of Fama & French regressions are presented in order to understand how the returns of the significant momentum strategies 2×2 and 3×1 , which, indeed, presented the two highest positive average returns from all the 1296 strategies, load in each risk factor. Despite the fact that all the loadings present the same patterns as the loadings for momentum strategies for the sample with no size distinction, all of them are statistically insignificant. With the aim of comparing the results for the whole sample, the loadings for reversal strategies 28×4 and 28×5 are also displayed in Table 17. Once again, only for the reversal strategies, the winner portfolio has a short position and the loser portfolio has a long position, so the alphas show opposite signs to the ones presented in 11. As observed before, the reversal strategies have a positive high loading in HML and SMB, with a magnitude even higher than the reversal strategies for the whole stock sample, even though all coefficients are statistically equal to zero with the exception of the coefficient of 28×5 for HML.

Table 17: Fama & French Regressions - Small Stocks

	Alpha	MKT	SMB	HML
2×2				
Coefficients	0.0151	-0.0905	-0.3375	0.2238
P-Value	7.30%	52.67%	21.72%	24.76%
3×1				
Coefficients	0.0183	-0.0220	-0.1464	0.1933
P-Value	5.79%	91.18%	69.33%	44.05%
28×4				
Coefficients	0.0140	0.0803	0.4908	0.5067
P-Value	44.86%	75.94%	30.77%	6.46%
28×5				
Coefficients	0.0141	0.0672	0.4944	0.5343
P-Value	45.95%	79.56%	30.62%	4.23%

Note: The market proxy utilized in the regressions is MKT. Regressions use *OLS* method and standard errors are corrected by Newey-West with 1 lag.

Figure 6: Nominal Index - Trading Strategies - Small Stocks

The index display value 100 at the beginning of the return series for the strategies, 30/12/2004, and accumulates the nominal returns until the last day, 29/06/2012.

Even though none of the strategies for the big stocks subsample show a significant average nominal return, some of them generated abnormal returns. These strategies are formed with the past cumulative return of up to four months and are held for two to three years as highlighted in bold in Table 21. Since there is no evidence in the literature nor economic meaning related to these strategies and keeping in mind that all these strategies earn

average nominal returns of around zero, they might be the result of a statistical fluke. For example, the index of strategy 1×36 is presented in Figure 7. It suggests that no consistent pattern seems to exist in the returns and, so, the result might be a due to a statistical fluke.

Figure 7: Nominal Index - Trading Strategies - Big Stocks

The index display value 100 at the beginning of the return series for the strategies, 30/12/2004, and accumulates the nominal returns until the last day, 29/06/2012.

Table 18: Fama & French Alphas Regressions with MKT market proxy - Small Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.01	0.98	0.56	-0.04	0.06	0.13	-0.17	-0.04	-0.22	-0.27	-0.21	-0.28	0.43	0.42	0.36	0.37	0.30	0.34
2	1.17	1.51	0.72	0.50	0.48	0.09	-0.09	-0.22	0.47	0.51	-0.23	0.43	0.39	0.25	0.21	0.25	0.20	0.24
3	1.83	0.95	0.85	0.30	0.25	0.02	0.36	0.31	0.48	0.33	0.30	0.17	-0.05	-0.03	-0.06	0.02	0.13	0.09
4	0.32	0.08	0.48	0.12	0.12	-0.23	-0.37	-0.25	-0.26	-0.35	-0.40	-0.54	-0.67	-0.71	-0.65	-0.55	-0.49	-0.49
5	1.35	0.65	0.02	-0.12	0.53	0.34	0.33	0.37	0.26	0.15	0.05	-0.12	-0.31	-0.40	-0.27	-0.22	-0.18	-0.15
6	0.72	0.22	-0.18	-0.52	-0.51	-0.32	-0.38	-0.31	-0.37	-0.45	-0.50	-0.59	-0.74	-0.73	-0.64	-0.56	-0.50	-0.47
7	0.07	0.58	0.12	-0.18	0.09	-0.12	-0.33	-0.27	-0.33	-0.41	-0.50	-0.50	-0.58	-0.50	-0.39	-0.33	-0.26	-0.28
8	0.03	0.14	-0.39	-0.15	-0.34	-0.49	-0.55	-0.55	-0.55	-0.61	-0.55	-0.54	-0.43	-0.41	-0.31	-0.28	-0.24	-0.18
9	-0.05	-0.17	-0.20	-0.49	-0.65	-0.63	-0.56	-0.53	-0.65	-0.68	-0.60	-0.56	-0.54	-0.44	-0.35	-0.33	-0.32	-0.31
10	0.51	0.61	0.29	-0.14	-0.35	-0.45	-0.42	-0.44	-0.47	-0.46	-0.26	-0.32	-0.23	-0.13	-0.12	-0.09	-0.10	-0.12
11	-0.17	0.28	0.20	-0.09	-0.27	-0.32	-0.30	-0.26	-0.24	-0.09	-0.05	-0.09	0.03	0.05	0.11	0.14	0.11	0.09
12	0.39	0.27	-0.16	-0.42	-0.65	-0.63	-0.47	-0.41	-0.35	-0.33	-0.27	-0.22	-0.16	-0.13	-0.08	-0.08	-0.07	-0.11
13	0.51	-0.17	-0.44	-0.61	-0.62	-0.56	-0.43	-0.20	-0.24	-0.24	-0.21	-0.19	-0.12	-0.08	-0.08	-0.08	-0.13	-0.09
14	-0.10	-0.51	-0.58	-0.64	-0.56	-0.46	-0.37	-0.39	-0.36	-0.32	-0.14	-0.10	-0.03	0.00	0.03	0.02	0.03	0.04
15	0.73	-0.06	-0.07	-0.28	-0.47	-0.46	-0.44	-0.45	-0.39	-0.36	-0.17	-0.13	-0.06	-0.01	0.00	0.04	0.08	0.08
16	0.27	-0.33	-0.30	-0.60	-0.60	-0.61	-0.59	-0.57	-0.52	-0.43	-0.28	-0.18	-0.08	-0.05	0.03	0.07	0.10	0.17
17	0.07	-0.28	-0.60	-0.70	-0.72	-0.63	-0.58	-0.40	-0.37	-0.24	-0.12	0.00	0.06	0.12	0.09	0.12	0.20	0.25
18	0.33	-0.55	-0.74	-0.70	-0.69	-0.67	-0.63	-0.57	-0.55	-0.36	-0.25	-0.11	-0.05	-0.02	0.03	0.08	0.18	0.26
19	0.14	-0.53	-0.33	-0.40	-0.36	-0.46	-0.50	-0.46	-0.33	-0.20	-0.12	0.00	0.04	0.05	0.11	0.21	0.30	0.38
20	0.52	-0.24	0.01	-0.06	-0.24	-0.37	-0.36	-0.18	0.01	0.11	0.24	0.33	0.36	0.42	0.45	0.51	0.54	0.53
21	0.44	0.08	-0.03	-0.17	-0.24	-0.36	-0.40	-0.21	-0.29	-0.17	-0.05	0.02	0.10	0.24	0.31	0.36	0.36	0.41
22	0.89	0.53	0.34	0.11	-0.06	-0.24	-0.35	-0.23	-0.08	0.03	0.10	0.12	0.19	0.30	0.29	0.31	0.42	0.50
23	0.51	0.54	0.41	0.04	-0.15	-0.30	-0.44	-0.32	-0.38	-0.28	-0.12	-0.06	0.06	0.06	0.06	0.20	0.33	0.37
24	0.14	0.57	0.08	-0.41	-0.27	-0.41	-0.49	-0.42	-0.43	-0.33	-0.10	-0.07	-0.10	-0.08	0.01	0.13	0.23	0.33
25	0.07	0.09	-0.40	-0.64	-0.88	-0.99	-1.02	-1.01	-0.90	-0.58	-0.32	-0.30	-0.29	-0.14	-0.01	0.09	0.18	0.20
26	0.13	-0.56	-0.87	-1.16	-1.22	-1.23	-1.25	-1.19	-1.00	-0.69	-0.59	-0.51	-0.32	-0.18	-0.05	0.06	0.14	0.16
27	0.04	-0.63	-1.05	-1.38	-1.37	-1.35	-1.30	-0.95	-0.77	-0.63	-0.50	-0.29	-0.09	0.03	0.16	0.29	0.35	0.38
28	-0.20	-0.88	-1.08	-1.40	-1.41	-1.35	-1.27	-0.90	-0.69	-0.56	-0.35	-0.11	0.05	0.21	0.37	0.43	0.48	0.51
29	-0.81	-0.91	-1.13	-1.19	-1.23	-1.20	-1.10	-1.02	-0.83	-0.54	-0.27	-0.06	0.14	0.28	0.35	0.38	0.43	0.43
30	0.17	-0.67	-0.89	-1.01	-0.97	-0.96	-0.93	-0.76	-0.42	-0.10	0.07	0.25	0.42	0.48	0.56	0.63	0.61	0.59
31	-0.34	-1.03	-1.12	-1.04	-0.92	-1.10	-1.06	-0.64	-0.46	-0.25	0.03	0.25	0.36	0.46	0.51	0.53	0.50	0.44
32	-1.14	-1.10	-1.02	-1.06	-1.16	-1.21	-0.67	-0.26	0.00	0.28	0.49	0.69	0.73	0.79	-0.03	-0.05	0.71	0.68
33	-0.86	-0.47	-0.59	-0.89	-0.93	-0.53	-0.32	-0.10	0.21	0.46	0.65	0.77	0.01	0.05	0.04	0.06	0.07	0.08
34	-0.31	-0.74	-1.32	-1.44	-0.77	-0.61	-0.36	-0.02	0.30	0.48	0.70	0.02	0.05	0.03	0.01	-0.01	0.01	0.06
35	-0.54	-1.29	-1.65	-1.17	-0.86	-0.58	-0.19	0.13	0.37	0.59	0.72	0.79	0.79	0.74	0.72	0.75	-0.05	-0.05
36	-1.42	-1.81	-1.49	-1.26	-0.68	-0.23	0.11	0.36	0.61	0.72	0.01	0.05	-0.01	-0.03	-0.04	-0.02	-0.06	-0.07

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 19: Fama & French Alphas Regressions with MKT market proxy - Small Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.35	0.40	0.32	0.40	0.37	0.37	0.42	0.39	0.43	0.43	0.33	0.34	0.38	0.42	0.35	0.35	0.32	0.26
2	0.25	0.23	0.22	0.25	0.26	0.31	0.27	0.27	0.30	0.28	0.28	0.34	0.37	0.33	0.33	0.32	0.23	0.18
3	0.07	0.10	0.11	0.13	0.13	0.18	0.12	0.15	0.15	0.17	0.14	0.16	0.12	0.15	0.13	0.04	-0.01	0.03
4	-0.48	-0.47	-0.46	-0.42	-0.42	-0.37	-0.37	-0.40	-0.40	-0.38	-0.41	-0.39	-0.35	-0.34	-0.42	-0.47	-0.42	-0.40
5	-0.13	-0.15	-0.15	-0.17	-0.19	-0.14	-0.16	-0.20	-0.17	-0.19	-0.23	-0.15	-0.12	-0.17	-0.23	-0.17	-0.16	-0.08
6	-0.45	-0.46	-0.46	-0.48	-0.50	-0.49	-0.50	-0.51	-0.47	-0.47	-0.44	-0.38	-0.44	-0.46	-0.43	-0.40	-0.31	-0.22
7	-0.27	-0.32	-0.35	-0.39	-0.39	-0.38	-0.39	-0.37	-0.31	-0.25	-0.22	-0.26	-0.30	-0.27	-0.23	-0.13	-0.04	0.03
8	-0.19	-0.20	-0.22	-0.26	-0.29	-0.30	-0.27	-0.25	-0.20	-0.16	-0.23	-0.25	-0.24	-0.21	-0.12	-0.01	0.05	0.12
9	-0.26	-0.26	-0.29	-0.33	-0.32	-0.27	-0.25	-0.23	-0.18	-0.26	-0.30	-0.26	-0.24	-0.15	-0.11	-0.04	0.03	0.11
10	-0.10	-0.13	-0.16	-0.18	-0.11	-0.08	-0.08	-0.05	-0.11	-0.15	-0.12	-0.08	-0.01	0.04	0.11	0.20	0.27	0.34
11	0.09	0.06	0.03	0.04	0.10	0.11	0.10	0.08	0.06	0.09	0.12	0.22	0.24	0.28	0.35	0.42	0.48	0.50
12	-0.09	-0.09	-0.03	-0.01	0.03	0.04	-0.03	-0.09	-0.06	-0.02	0.08	0.14	0.21	0.28	0.32	0.41	0.39	0.36
13	-0.06	-0.04	0.00	0.03	0.08	0.10	0.05	0.05	0.10	0.13	0.18	0.31	0.38	0.39	0.46	0.46	0.43	0.41
14	0.05	0.09	0.15	0.16	0.19	0.14	0.17	0.22	0.30	0.31	0.32	0.42	0.45	0.53	0.53	0.51	0.45	0.41
15	0.11	0.17	0.21	0.18	0.15	0.17	0.19	0.30	0.30	0.30	0.38	0.44	0.49	0.52	0.50	0.46	0.39	0.37
16	0.20	0.28	0.25	0.23	0.28	0.31	0.43	0.43	0.48	0.52	0.55	0.65	0.66	0.67	0.64	0.60	0.57	0.56
17	0.30	0.36	0.36	0.40	0.47	0.59	0.63	0.68	0.72	0.72	-0.03	0.02	0.02	0.02	0.00	-0.04	-0.10	0.68
18	0.32	0.31	0.37	0.42	0.56	0.60	0.65	0.71	0.69	-0.06	-0.04	-0.01	-0.02	-0.02	-0.06	-0.10	0.68	0.67
19	0.39	0.44	0.49	0.63	0.71	-0.03	0.02	-0.01	0.03	0.01	0.01	0.01	0.00	0.00	-0.02	-0.06	-0.10	-0.06
20	0.58	0.64	-0.05	0.01	0.09	0.16	0.14	0.17	0.15	0.11	0.10	0.11	0.10	0.09	0.07	0.04	0.06	0.05
21	0.46	0.57	0.65	0.74	0.01	-0.02	0.02	0.01	-0.03	-0.05	-0.06	-0.07	-0.08	-0.07	-0.07	-0.04	-0.07	-0.03
22	0.60	0.67	-0.03	0.03	0.02	0.07	0.05	0.00	-0.03	-0.06	-0.08	-0.08	-0.07	-0.07	-0.03	-0.03	0.00	0.07
23	0.44	0.53	0.66	0.69	-0.05	-0.07	0.68	0.64	0.59	0.56	0.56	0.58	0.57	0.65	0.66	0.69	-0.08	-0.05
24	0.34	0.45	0.47	0.55	0.58	0.51	0.46	0.41	0.35	0.35	0.37	0.38	0.45	0.48	0.50	0.57	0.59	0.64
25	0.29	0.32	0.35	0.36	0.34	0.30	0.26	0.20	0.19	0.21	0.22	0.32	0.33	0.34	0.39	0.42	0.46	0.51
26	0.18	0.21	0.21	0.20	0.19	0.16	0.12	0.09	0.08	0.09	0.11	0.14	0.13	0.16	0.18	0.23	0.26	0.34
27	0.47	0.46	0.43	0.40	0.37	0.31	0.28	0.25	0.24	0.27	0.28	0.31	0.31	0.34	0.38	0.41	0.46	0.47
28	0.49	0.46	0.44	0.43	0.41	0.39	0.35	0.32	0.37	0.38	0.40	0.41	0.43	0.42	0.45	0.49	0.48	0.49
29	0.43	0.40	0.39	0.41	0.40	0.38	0.37	0.40	0.40	0.39	0.40	0.41	0.42	0.41	0.43	0.44	0.43	0.46
30	0.58	0.56	0.53	0.54	0.51	0.49	0.53	0.50	0.47	0.45	0.47	0.47	0.44	0.46	0.46	0.44	0.45	0.42
31	0.44	0.45	0.47	0.45	0.44	0.51	0.49	0.49	0.52	0.54	0.53	0.51	0.52	0.52	0.49	0.51	0.48	0.44
32	0.66	0.65	0.63	0.63	0.67	0.64	0.60	0.61	0.62	0.61	0.61	0.63	-0.18	-0.19	-0.16	-0.17	0.59	0.56
33	0.09	0.04	0.00	0.08	0.07	0.11	0.11	0.08	0.11	0.11	0.12	0.12	0.11	0.11	0.06	0.02	-0.02	-0.05
34	0.01	-0.02	-0.02	0.00	-0.01	0.06	0.08	0.10	0.09	0.09	0.08	0.07	0.07	0.06	0.03	0.01	-0.06	-0.08
35	-0.07	-0.06	-0.07	-0.05	-0.05	-0.02	-0.06	-0.09	-0.10	-0.10	-0.12	-0.12	-0.12	-0.12	-0.13	-0.17	-0.20	-0.23
36	0.00	0.01	-0.04	-0.02	-0.01	-0.03	-0.07	-0.13	-0.15	-0.15	-0.15	-0.16	-0.17	-0.17	-0.21	-0.21	0.56	0.52

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 20: Fama & French Alphas Regressions with MKT market proxy - Big Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.64	0.18	0.25	0.20	-0.28	-0.23	-0.30	-0.24	-0.30	-0.20	-0.07	-0.16	-0.20	-0.19	-0.24	-0.22	-0.26	-0.19
2	-0.20	0.03	-0.13	-0.08	-0.01	-0.03	-0.09	-0.13	-0.09	-0.01	0.00	0.00	-0.06	-0.11	-0.13	-0.18	-0.21	-0.19
3	-0.17	-0.24	-0.11	-0.04	0.15	0.08	-0.02	0.00	0.05	0.04	0.02	-0.02	-0.10	-0.16	-0.21	-0.21	-0.23	-0.23
4	0.15	-0.37	-0.14	-0.06	0.15	0.10	0.05	0.07	0.02	0.05	0.05	-0.04	-0.10	-0.17	-0.18	-0.19	-0.23	-0.19
5	-0.14	0.14	0.21	0.17	0.21	0.18	0.16	0.15	0.13	0.17	0.14	0.05	-0.04	-0.09	-0.12	-0.15	-0.17	-0.15
6	0.23	0.29	0.32	0.12	0.20	0.22	0.17	0.14	0.09	0.08	0.07	-0.05	-0.07	-0.08	-0.13	-0.13	-0.15	-0.10
7	0.42	0.35	0.28	0.22	0.34	0.25	0.21	0.15	0.12	0.10	0.05	0.01	-0.05	-0.09	-0.12	-0.11	-0.11	-0.09
8	0.35	0.04	0.11	0.12	0.19	0.13	0.04	-0.01	-0.05	-0.07	0.00	-0.05	0.66	0.64	0.61	0.64	-0.17	-0.14
9	-0.13	0.60	-0.10	-0.02	0.03	-0.04	-0.13	0.65	0.64	0.68	0.68	0.59	0.54	0.52	0.53	0.56	0.60	0.64
10	-0.21	-0.07	-0.03	-0.05	0.00	0.66	0.53	0.47	0.57	0.58	0.53	0.47	0.44	0.48	0.49	0.54	0.55	0.56
11	-0.12	-0.13	-0.13	0.63	0.60	0.53	0.47	0.58	0.63	0.59	0.56	0.54	0.54	0.56	0.58	0.62	0.63	0.63
12	0.55	0.51	0.54	0.45	0.45	0.36	0.38	0.45	0.46	0.45	0.43	0.43	0.44	0.46	0.46	0.50	0.54	0.52
13	0.38	0.45	0.53	0.46	0.48	0.53	0.52	0.51	0.47	0.47	0.46	0.46	0.47	0.49	0.53	0.57	0.59	0.56
14	0.55	0.37	0.41	0.34	0.52	0.53	0.44	0.38	0.35	0.36	0.37	0.37	0.37	0.39	0.41	0.44	0.44	0.42
15	0.37	0.30	0.25	0.44	0.51	0.48	0.39	0.40	0.44	0.45	0.45	0.44	0.46	0.48	0.48	0.48	0.45	0.44
16	-0.06	-0.01	0.22	0.35	0.43	0.40	0.32	0.39	0.39	0.39	0.42	0.42	0.42	0.44	0.43	0.42	0.42	0.38
17	-0.18	0.12	0.33	0.30	0.35	0.28	0.30	0.33	0.35	0.39	0.42	0.42	0.42	0.42	0.40	0.37	0.34	0.33
18	-0.19	0.09	0.20	0.16	0.17	0.15	0.18	0.25	0.30	0.34	0.37	0.36	0.36	0.34	0.32	0.27	0.25	0.25
19	-0.07	0.05	0.15	0.08	0.14	0.16	0.20	0.29	0.31	0.34	0.37	0.37	0.37	0.35	0.33	0.30	0.28	0.27
20	-0.19	-0.02	-0.06	-0.02	0.02	0.07	0.13	0.20	0.26	0.29	0.32	0.30	0.30	0.29	0.28	0.26	0.26	0.26
21	-0.06	0.03	0.09	0.13	0.20	0.18	0.24	0.27	0.31	0.29	0.31	0.31	0.30	0.29	0.29	0.26	0.28	0.28
22	-0.06	0.00	0.05	0.04	0.12	0.12	0.13	0.16	0.17	0.18	0.24	0.23	0.23	0.20	0.18	0.18	0.19	0.19
23	0.04	0.16	0.11	0.07	0.17	0.13	0.10	0.12	0.16	0.18	0.19	0.21	0.20	0.18	0.18	0.18	0.16	0.16
24	0.45	0.43	0.28	0.19	0.21	0.13	0.11	0.09	0.13	0.15	0.17	0.16	0.16	0.15	0.16	0.14	0.13	0.13
25	0.26	0.10	0.08	0.04	0.11	0.04	0.06	0.06	0.10	0.12	0.11	0.11	0.16	0.17	0.16	0.14	0.14	0.14
26	-0.12	0.04	0.00	-0.04	0.00	0.01	0.04	0.05	0.07	0.07	0.08	0.08	0.13	0.13	0.11	0.09	0.10	0.13
27	0.09	0.02	-0.05	-0.15	-0.06	-0.05	-0.03	0.00	-0.01	-0.01	0.01	0.03	0.07	0.07	0.07	0.10	0.12	0.12
28	-0.29	-0.12	-0.24	-0.25	-0.15	-0.11	-0.09	-0.06	-0.05	0.03	0.07	0.09	0.12	0.11	0.14	0.16	0.14	0.16
29	0.03	-0.14	-0.22	-0.18	-0.15	-0.14	-0.12	-0.13	-0.05	0.00	0.03	0.04	0.07	0.11	0.13	0.12	0.14	0.14
30	-0.31	-0.21	-0.15	-0.19	-0.15	-0.14	-0.12	-0.07	0.00	0.03	0.06	0.08	0.13	0.16	0.18	0.17	0.18	0.20
31	-0.19	-0.24	-0.21	-0.29	-0.26	-0.27	-0.14	-0.06	-0.02	0.02	0.05	0.10	0.15	0.16	0.19	0.19	0.21	0.24
32	-0.54	-0.40	-0.29	-0.24	-0.20	-0.09	-0.05	-0.01	0.05	0.06	0.13	0.19	0.23	0.26	0.28	0.29	0.33	0.35
33	-0.33	-0.27	-0.18	-0.17	-0.06	-0.03	-0.01	0.02	0.04	0.11	0.19	0.23	0.26	0.28	0.31	0.35	0.37	0.40
34	0.25	0.07	0.06	0.09	0.15	0.13	0.14	0.15	0.21	0.28	0.33	0.36	0.40	0.42	0.46	0.48	0.49	0.48
35	-0.14	0.00	0.10	0.15	0.14	0.14	0.09	0.16	0.29	0.32	0.38	0.41	0.45	0.50	0.53	0.56	0.56	0.56
36	0.04	0.20	0.12	0.14	0.16	0.14	0.17	0.28	0.39	0.42	0.48	0.51	0.56	0.58	0.62	0.61	0.62	0.62

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 21: Fama & French Alphas Regressions with MKT market proxy - Big Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	-0.20	-0.24	-0.25	-0.23	-0.23	-0.21	-0.19	-0.22	-0.24	-0.27	-0.30	-0.35	-0.34	-0.34	0.46	0.46	0.45	-0.35
2	-0.23	-0.26	-0.26	-0.25	-0.22	-0.19	-0.20	-0.23	-0.28	0.50	0.47	0.45	0.43	0.42	0.44	0.43	0.45	0.46
3	-0.27	-0.28	-0.25	-0.24	-0.19	-0.17	-0.18	-0.23	0.53	0.47	0.44	0.42	0.41	0.42	0.42	0.43	0.44	0.46
4	-0.22	-0.23	-0.21	-0.16	-0.13	-0.14	-0.18	-0.27	0.49	0.45	0.42	0.38	0.37	0.37	0.38	0.40	0.41	0.43
5	-0.13	-0.16	-0.11	-0.08	-0.05	-0.07	-0.14	-0.22	0.53	0.49	0.44	0.40	0.39	0.40	0.41	0.42	0.42	0.42
6	-0.13	-0.13	-0.12	-0.10	-0.12	-0.16	-0.22	0.53	0.47	0.41	0.40	0.37	0.37	0.39	0.38	0.38	0.37	0.37
7	-0.10	-0.12	-0.13	-0.14	-0.18	0.58	0.52	0.45	0.38	0.36	0.34	0.32	0.33	0.32	0.31	0.31	0.29	0.31
8	-0.14	-0.16	-0.17	0.63	0.61	0.57	0.51	0.45	0.41	0.38	0.37	0.34	0.34	0.33	0.32	0.32	0.33	0.36
9	0.65	0.61	0.58	0.56	0.51	0.48	0.42	0.37	0.33	0.28	0.28	0.27	0.27	0.26	0.25	0.27	0.30	0.33
10	0.56	0.51	0.48	0.43	0.39	0.35	0.32	0.28	0.23	0.20	0.19	0.18	0.19	0.18	0.18	0.19	0.22	0.25
11	0.62	0.58	0.53	0.48	0.44	0.41	0.37	0.32	0.29	0.25	0.23	0.21	0.22	0.22	0.23	0.25	0.28	0.31
12	0.50	0.45	0.41	0.37	0.36	0.32	0.29	0.26	0.22	0.19	0.17	0.15	0.16	0.18	0.19	0.22	0.25	0.28
13	0.53	0.48	0.44	0.42	0.39	0.36	0.33	0.27	0.25	0.21	0.19	0.18	0.19	0.22	0.24	0.26	0.29	0.32
14	0.40	0.35	0.33	0.30	0.29	0.26	0.23	0.19	0.17	0.15	0.15	0.15	0.18	0.20	0.21	0.24	0.26	0.29
15	0.43	0.38	0.35	0.32	0.30	0.28	0.25	0.22	0.20	0.20	0.20	0.21	0.22	0.24	0.25	0.28	0.31	0.34
16	0.36	0.32	0.30	0.28	0.25	0.24	0.23	0.20	0.19	0.19	0.21	0.22	0.24	0.26	0.27	0.28	0.32	0.35
17	0.32	0.28	0.25	0.24	0.23	0.20	0.19	0.17	0.18	0.19	0.20	0.20	0.22	0.25	0.26	0.29	0.31	0.33
18	0.23	0.21	0.20	0.18	0.14	0.13	0.13	0.13	0.14	0.15	0.16	0.17	0.20	0.22	0.24	0.26	0.29	0.30
19	0.26	0.22	0.20	0.18	0.16	0.16	0.16	0.17	0.17	0.18	0.20	0.21	0.22	0.24	0.27	0.27	0.30	0.32
20	0.26	0.24	0.21	0.19	0.18	0.20	0.21	0.21	0.21	0.22	0.25	0.25	0.27	0.29	0.29	0.30	0.32	0.34
21	0.28	0.24	0.22	0.20	0.21	0.23	0.24	0.23	0.24	0.26	0.28	0.29	0.30	0.31	0.31	0.32	0.34	0.36
22	0.19	0.17	0.15	0.17	0.18	0.20	0.22	0.23	0.25	0.26	0.29	0.29	0.30	0.31	0.32	0.33	0.35	0.37
23	0.14	0.14	0.14	0.14	0.15	0.17	0.20	0.21	0.22	0.23	0.25	0.25	0.26	0.25	0.25	0.27	0.30	0.32
24	0.14	0.15	0.15	0.17	0.20	0.24	0.26	0.27	0.28	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.38	0.40
25	0.15	0.16	0.17	0.19	0.22	0.25	0.27	0.27	0.28	0.28	0.31	0.30	0.31	0.32	0.32	0.34	0.36	0.38
26	0.13	0.14	0.16	0.18	0.20	0.21	0.23	0.24	0.25	0.26	0.27	0.27	0.29	0.30	0.31	0.34	0.36	0.38
27	0.14	0.16	0.19	0.22	0.23	0.25	0.26	0.27	0.28	0.29	0.29	0.30	0.31	0.33	0.34	0.36	0.39	0.41
28	0.18	0.19	0.22	0.23	0.25	0.26	0.26	0.26	0.26	0.26	0.27	0.26	0.28	0.31	0.31	0.33	0.35	0.37
29	0.16	0.20	0.21	0.22	0.24	0.25	0.25	0.25	0.24	0.24	0.23	0.25	0.27	0.28	0.29	0.30	0.33	0.35
30	0.23	0.26	0.27	0.27	0.28	0.29	0.29	0.29	0.27	0.26	0.27	0.27	0.27	0.29	0.29	0.31	0.34	0.36
31	0.27	0.30	0.30	0.31	0.33	0.33	0.33	0.33	0.31	0.32	0.32	0.32	0.33	0.34	0.36	0.37	0.39	0.41
32	0.39	0.38	0.39	0.40	0.40	0.40	0.39	0.37	0.35	0.35	0.34	0.35	0.36	0.37	0.38	0.39	0.41	0.42
33	0.41	0.41	0.42	0.42	0.42	0.43	0.39	0.38	0.38	0.37	0.37	0.39	0.40	0.40	0.42	0.43	0.45	0.45
34	0.48	0.47	0.46	0.46	0.47	0.45	0.44	0.42	0.41	0.40	0.40	0.40	0.40	0.40	0.41	0.42	0.43	0.43
35	0.55	0.52	0.52	0.52	0.50	0.49	0.47	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.45	0.44	0.45	0.46
36	0.59	0.57	0.57	0.54	0.52	0.50	0.48	0.47	0.47	0.47	0.46	0.46	0.46	0.47	0.47	0.47	0.47	0.49

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

3.5.4 Robustness

Analogously to Subsection 3.4, the alphas for the regressions with the other two market proxies are available in Tables 35 to 42 in the Appendix D: Robustness - Tables. The results presented above are sustained for any market proxy used.

4. Conclusion

In this study, 1296 trading strategies are tested in order to provide evidence for the existence of a momentum or reversal effect. The results do not find evidence of a reversal effect for Brazil and only weak evidence for momentum in the very short term. The results placed in the context of previous academic studies, seem to suggest that a reversal effect, in evidence in the eighties, is disappearing due to possible increases in efficiency in the financial stock market in Brazil. However, this hypothesis is puzzling since recent studies observe the continuation of both reversal and momentum effects in developed and, theoretically more efficient, capital markets. With regards to momentum, the evidence still seems to be ambiguous and in the best case scenario the Brazilian momentum effect is weak.

Taking advantage of the great number of strategies tested in this work, seasonality patterns are examined through panel regressions. Selecting the most profitable strategies for each group of strategies, a panel regression is carried out on twelve dummies, each representing one month. In contrast with national and international literature, January seasonality is not observed for either effects. However, evidence of end-of-semester seasonality is found for momentum strategies and November seasonality is documented for all groups of reversal strategies.

To evaluate the exposure of the trading strategies to factors risk, the Fama & French proxies have been developed for Brazil. In contrast with the international literature, even momentum strategies are explained by their exposure to value risk. In addition, reversal strategies are also explained by higher loadings on Fama & French proxies, especially the positive loadings in value premium. To attain robustness, all the regressions are carried out with two more market proxies. Generally, the results are not sensitive to the choice of the proxy.

In order to verify whether the negative results about the existence of momentum and reversal effects were restricted to the big stocks, the sample is divided by the median of the firm's market value for each month. The stocks above the median formed the big stocks subsample and the ones below, formed the small stocks subsample. Examining the same trading strategies for both subsamples, it is still not possible to find evidence of reversal effect in either subsample and the weak evidence of momentum persists only for small stocks. With regards to seasonality patterns it is clear that the previous evidence is restricted to the small subsample. Finally, no relevant strategy generates abnormal returns in either subsample.

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A Appendix A: Database Details

Due to corporate actions, stock prices may present variations that do not reflect appreciation or depreciation in stock value, but only produce a nominal variation. For example, stocks that are split into X new shares will drop in price by $1/X\%$. This variation in price is not due to depreciation in the value of the company, but is just a variation in the nominal value of that stock. To neutralize that discontinuity in the price series, Economatica divides all the prices before the split date by the number of new shares (X) or, equivalently, multiplies the entire past price series by an adjustment factor equal to $1/X$. In order to obtain the actual appreciation or depreciation of stocks, the price used in this work considers the adjustments for all the corporate events listed below. The list with all the included corporate events by Economatica and their corresponding adjustment factor is shown below:

$$\begin{aligned}
 \text{Cash Dividends: } F &= 1 - D/Pu \\
 \text{Stock Dividends: } F &= 1/(1 + b) \\
 \text{Stock Splits: } F &= 1/d \\
 \text{Capital Reduction: } F &= 1/(1 - r) \\
 \text{Reversed Splits: } F &= g \\
 \text{Rights Issues: } F &= (Pu + sS)/((1 + s)Pu) \\
 \text{Spinoff: } F &= (1 - c/100)
 \end{aligned}$$

where F = adjustment factor, Pu = original price at last date with right, D = dividend value, b = number of new shares received for each share held, d = number of new shares replacing each old share, r = number of shares canceled for each share held, g = number of old shares being replaced by each new share, S = subscription price, s = number of new shares offered for each share held, c = percentage of the market value represented by the unit spun off.

Market value or market capitalization of an asset class is defined as the number of outs-

tanding stocks¹⁵ of that class multiplied by the contemporaneous price of a single share of that class, being, $ME_{i,t} = P_{i,t}Q_{i,t}$, where i indicates the class type. The firm's market value is just the sum of the market value of each stock class of the same firm, ie: $ME_{j,t} = \sum_i^N ME_{i,t}$, where j identifies the firm and i refers to all the class types from the firm.

Since in this paper the data are recorded on a monthly basis, the market value of interest is the value at the end of the month, which would be the price multiplied by the number of shares, both from the last business day of the month. However not all stocks have been negotiated on the last business day of the month. In these cases, the market value is reached using the price of the last trading day for that month and the number of shares on the last business day of the month¹⁶. Due to corporate events between the last available price for the month and the last business day, prices must be adjusted to correctly measure the market value. For example, suppose the last available price for stock A is X on the 17th April and during the period until the last day of the month a dividend of d Brazilian reais per share is distributed to shareholders. The price used to calculate the market value must be $X - d$ to account for the decrease in market capitalization.

Economatica also accounts for other corporate events besides the payment of dividends. While carrying out reverse engineering from the Economatica market value, it was observed that other corporate events such as splits, reversed splits and rights issues took place for some stocks between the period covering the last available price and the last day of month. For each one of these corporate events Economatica adjusts the price as described using the respective factor above.

However, a small point should be emphasized regarding the calculations made by Econo-

¹⁵Issued stocks are divided into treasury stocks, which are not available for negotiation, and outstanding stocks, which can be traded on the stock market.

¹⁶Economatica provides an option that enables the user to set a tolerance window that defines how many days from the end of the month the closest price can be (weekends are not counted). In this paper a 21 day tolerance window was used, to cover, approximately one month.

matica. There are some stocks due to pay dividends, whose ex-date is on January 1th. Since the ex-date is the date from which the stocks are traded for which rights to the dividend are not binding, the price on the last day of December should not be decreased by the amount of the dividend when the market value is calculated. Only 1.9% of stocks in the database present this incorrect adjustment in price. In addition the estimated degree of the distortion of the correct value is small, around 7.8%, with a standard deviation of 3.3%, maximum value of 16.6%, minimum value of 1.12% and that mainly occurred before 2004. Therefore, the frequency and the magnitude of this distortion are not sufficient to create significant interference to the results obtained in this work.

Theoretically, book-to-market is the ratio between the book value divided by the market value of the firm. Since in the Brazilian stock market, some firms have two types of stocks, ON and PN, the calculation for book-to-market must be adapted. The equivalent calculation would be the book value divided by the sum of the number of shares of ON and PN then divided by the ON price to obtain the book-to-market of ON and, analogously, by the PN price to obtain the PN book-to-market. So, in other words, it is the book value per share divided by the price. Economatica provides the ratio price-to-book value per share so this data is extracted and subsequently inverted to obtain the book-to-market ratio and this is used in the calculation of Fama & French portfolios. The same observations about the adjustments made by Economatica in price mentioned in the last paragraph are valid for ratio price-to-book per share available in Economatica.

IBOV and MSCI indexes are two of the proxies used to measure the return of the market. IBOV is an index developed to include the most traded and liquid stocks in the Brazilian stock market, representing more than 80% of the number of trades and approximately 70% of market capitalization of BM&FBOVESPA¹⁷. The MSCI Investable Market Index (IMI) which covers all investable large, mid and small cap securities in Brazil, targets approximately 99% of the market's free-float adjusted market capitalization. This data is

¹⁷http://www.bmfbovespa.com.br/Indices/download/IBovespa_ing.pdf

downloaded directly from the MSCI site¹⁸.

To the risk free asset we adopt the fixed rate of the Brazilian fixed-floating 30 days PRE-DI swap calculated by BM&F. The PRE-DI swap is a contract of exchange rates in which the PRE is the fixed rate agreed and DI is the floating rate that is calculated as an average of interbank loans. The fixed rate of Brazilian fixed-floating 30 days PRE-DI swap is expressed on an exponential annual basis, where the year is considered as 252 business days. Since all the returns in this work are calculated at the discrete rate, the swap rate is converted by $R_{d,t}^{SWAP} = \exp(R_{e,t}^{SWAP})^{21/252} - 1$, where the $R_{e,t}^{SWAP}$ is the exponential annual rate and the $R_{d,t}^{SWAP}$ is the monthly discrete swap rate calculated. This data is obtained in the Bloomberg terminal.

The IPCA rate is used to deflate the stock market returns and the risk free rate. The index is calculated by IBGE¹⁹ and aims to measure monthly inflation by the variation in prices of basic food baskets for families with monthly incomes of between one and forty minimum salaries in the major cities of Brazil.

B Appendix B: Fama & French Six Portfolios Tables

Table 22: Medium Market Value of the Firm

	SL	SM	SH	BL	BM	BH
2000	451037.76	393101.19	321016.65	10375403.00	6039388.40	4335253.90
2001	562829.19	470421.66	295181.09	11137556.00	5124372.00	6086151.70
2002	384713.67	474952.01	287380.06	11207761.00	4817634.10	5402067.40
2003	683723.80	708416.21	456450.20	13194963.00	6828786.50	3996362.40
2004	1369741.80	1028138.70	473218.07	12129367.00	14501297.00	6673554.80
2005	1393523.50	1264258.50	532670.49	15132029.00	19181571.00	6765869.40
2006	1899147.10	1618490.40	809013.90	28596727.00	24536440.00	10477953.00
2007	2280393.50	2009656.00	1403091.00	41010026.00	32880421.00	13464936.00
2008	953927.69	956609.92	712559.01	52054764.00	14979731.00	11362175.00
2009	612765.31	745339.64	586876.92	22295779.00	23958343.00	8719443.00
2010	735941.42	901779.99	604486.52	22364894.00	28737140.00	10978522.00

(continue)

¹⁸<http://www.msci.com/products/indices/performance.html>

¹⁹<http://www.ibge.gov.br/english/>

Table 22: Medium Market Value of the Firm

	SL	SM	SH	BL	BM	BH
2011	947109.90	1184494.60	656299.30	16540031.00	39613642.00	25073467.00
Average	1022904.55	979638.24	594853.60	21336608.33	18433230.50	9444646.30

Note: These are average firm's market value of the assets in portfolios at the moment of formation (every June). The values are expressed in thousands and are not deflated. Considering that the dataset starts at 12/01/1998 and the liquidity restriction requires one year of historical data, the first six Fama & French portfolios are formed in July of 2000. Thus, despite of the availability of information for the others proxies, all the calculations made are restricted to the period between July/2000 until June/2012.

Table 23: Medium Book-to-Market

	SL	SM	SH	BL	BM	BH
2000	0.4022	1.0381	2.5022	0.3557	0.9464	3.4260
2001	0.4609	1.1559	3.2291	0.4558	1.1245	3.2717
2002	0.4512	1.2834	3.5360	0.5067	1.0209	2.7773
2003	0.5330	1.1808	4.9495	0.4898	1.1057	2.8762
2004	0.3496	0.7698	2.1331	0.3777	0.6890	1.6768
2005	0.3215	0.6537	1.7689	0.2942	0.5958	1.8489
2006	0.2873	0.6515	1.8730	0.2530	0.5866	1.7349
2007	0.2443	0.4804	1.3336	0.2188	0.4602	1.2127
2008	0.2080	0.4341	1.0145	0.2102	0.4200	1.0239
2009	0.3853	1.0371	2.4105	0.3789	0.9042	1.9151
2010	0.2002	0.5455	1.1638	0.2325	0.5204	1.0667
2011	0.2399	0.5990	1.2829	0.2144	0.5390	1.1900
Average	0.3403	0.8191	2.2664	0.3323	0.7427	2.0017

Note: These are average firm's market value of the assets in portfolios at the moment of formation (every June). In mind that the dataset starts on 12/01/1998 and the liquidity restriction requires one year of historical data, the first six Fama & French portfolios are formed in July of 2000. Thus, despite the availability of information for the others proxies, all the calculations made are restricted to the period between July/2000 and June/2012.

Table 24: Number of Stocks

	SL	SM	SH	BL	BM	BH
2000	15	29	30	29	30	15
2001	10	29	33	33	28	11
2002	12	23	32	28	31	8
2003	11	25	27	27	26	11
2004	11	26	33	31	31	9
2005	14	26	33	30	32	12
2006	15	23	35	29	35	9
2007	23	27	33	26	40	17
2008	25	47	43	44	45	26
2009	18	40	59	52	54	11
2010	24	39	55	47	57	17
2011	29	45	47	43	53	26
Average	17	32	38	35	39	14

Note: These are numbers of stocks allocated to each portfolio in the end of June of each year. Considering that the dataset starts at 12/01/1998 and the liquidity restriction requires one year of historical data, the first six Fama & French portfolios are formed in July of 2000. Thus, despite of the availability of information for the others proxies, all the calculations made are restricted to the period between July/2000 until June/2012.

C Appendix C: Average Real Returns

Table 25: Average Real Return - No Size Distinction - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.22	0.28	0.26	-0.24	-0.07	-0.07	-0.25	-0.29	0.40	-0.41	-0.25	-0.31	-0.40	-0.41	0.35	0.35	0.30	0.35
2	0.54	1.17	0.53	0.19	0.16	-0.06	-0.23	-0.33	0.36	0.40	-0.37	0.36	0.29	0.20	0.13	0.12	0.09	0.13
3	0.65	0.39	0.05	-0.16	-0.31	0.38	0.12	0.08	0.15	0.23	0.18	0.09	-0.04	-0.11	-0.15	-0.12	-0.08	-0.07
4	0.38	0.15	-0.12	-0.38	-0.36	0.30	0.13	0.15	0.12	0.05	0.03	-0.08	-0.20	-0.27	-0.25	-0.21	-0.22	-0.21
5	0.60	0.32	-0.05	-0.20	-0.34	0.25	0.21	0.16	0.06	0.02	-0.04	-0.15	-0.26	-0.29	-0.27	-0.26	-0.24	-0.22
6	0.27	0.41	0.15	-0.12	-0.19	-0.29	-0.37	-0.33	-0.34	-0.36	-0.38	-0.46	-0.48	-0.49	-0.46	-0.44	-0.41	-0.36
7	-0.15	-0.32	0.18	-0.10	0.08	-0.08	-0.19	-0.16	-0.22	-0.26	-0.30	-0.34	-0.35	-0.38	-0.35	-0.32	-0.29	-0.25
8	-0.13	0.27	-0.06	0.01	-0.14	-0.29	-0.37	-0.40	-0.42	-0.45	-0.40	-0.40	-0.40	-0.40	-0.37	-0.32	-0.30	-0.27
9	0.00	0.10	0.18	-0.04	-0.15	-0.22	-0.29	-0.27	-0.32	-0.29	-0.28	-0.30	-0.37	-0.35	-0.29	-0.25	-0.22	-0.20
10	-0.24	-0.33	0.36	0.00	-0.07	-0.15	-0.19	-0.26	-0.26	-0.22	-0.18	-0.23	-0.22	-0.19	-0.16	-0.13	-0.10	-0.07
11	-0.22	0.38	0.13	-0.15	-0.32	-0.39	-0.45	-0.40	-0.35	-0.27	-0.27	-0.28	-0.24	-0.25	-0.20	-0.18	-0.16	-0.14
12	0.19	0.11	-0.08	-0.43	-0.52	-0.55	-0.56	-0.49	-0.43	-0.45	-0.44	-0.40	-0.40	-0.37	-0.34	-0.32	-0.30	-0.29
13	0.32	-0.09	-0.32	-0.50	-0.54	-0.53	-0.54	-0.44	-0.44	-0.41	-0.40	-0.40	-0.37	-0.35	-0.33	-0.29	-0.28	-0.24
14	0.25	-0.14	-0.27	-0.42	-0.32	-0.43	-0.49	-0.50	-0.49	-0.45	-0.41	-0.44	-0.40	-0.39	-0.32	-0.29	-0.27	-0.25
15	0.26	-0.09	-0.22	-0.34	-0.38	-0.46	-0.48	-0.49	-0.43	-0.42	-0.42	-0.44	-0.41	-0.37	-0.33	-0.27	-0.24	-0.21
16	0.01	-0.42	-0.40	-0.59	-0.64	-0.62	-0.63	-0.57	-0.55	-0.53	-0.51	-0.47	-0.42	-0.37	-0.32	-0.25	-0.21	-0.20
17	-0.33	-0.36	-0.49	-0.62	-0.58	-0.64	-0.55	-0.55	-0.55	-0.53	-0.46	-0.41	-0.36	-0.31	-0.27	-0.23	-0.19	-0.17
18	-0.01	-0.49	-0.59	-0.76	-0.77	-0.74	-0.73	-0.65	-0.63	-0.51	-0.44	-0.45	-0.41	-0.36	-0.34	-0.31	-0.24	-0.23
19	-0.23	-0.65	-0.63	-0.68	-0.66	-0.66	-0.71	-0.65	-0.60	-0.51	-0.47	-0.50	-0.45	-0.41	-0.37	-0.31	-0.28	-0.27
20	-0.27	-0.58	-0.48	-0.47	-0.50	-0.59	-0.59	-0.49	-0.41	-0.35	-0.29	-0.31	-0.27	-0.22	-0.16	-0.12	-0.12	-0.11
21	0.28	-0.26	-0.33	-0.48	-0.54	-0.63	-0.63	-0.56	-0.57	-0.52	-0.44	-0.44	-0.36	-0.27	-0.20	-0.21	-0.17	-0.10
22	0.18	-0.22	-0.39	-0.47	-0.54	-0.63	-0.65	-0.60	-0.58	-0.49	-0.49	-0.48	-0.39	-0.30	-0.28	-0.25	-0.16	-0.09
23	0.27	-0.25	-0.28	-0.46	-0.58	-0.67	-0.72	-0.64	-0.58	-0.54	-0.53	-0.47	-0.37	-0.35	-0.29	-0.20	-0.11	0.00
24	-0.02	-0.22	-0.36	-0.58	-0.74	-0.83	-0.87	-0.82	-0.75	-0.70	-0.62	-0.57	-0.52	-0.44	-0.33	-0.24	-0.16	-0.08
25	0.00	-0.55	-0.68	-0.86	-0.96	-1.00	-1.01	-0.94	-0.86	-0.78	-0.64	-0.58	-0.47	-0.36	-0.26	-0.19	-0.12	-0.05
26	-0.03	-0.54	-0.78	-0.95	-1.04	-1.04	-1.02	-0.95	-0.80	-0.66	-0.61	-0.52	-0.39	-0.30	-0.22	-0.16	-0.10	-0.02
27	-0.08	-0.86	-1.02	-1.20	-1.17	-1.13	-1.09	-0.91	-0.77	-0.67	-0.56	-0.41	-0.28	-0.18	-0.10	-0.05	0.03	0.08
28	-0.58	-1.11	-1.23	-1.23	-1.17	-1.11	-0.98	-0.82	-0.71	-0.61	-0.43	-0.34	-0.22	-0.12	-0.05	0.04	0.08	0.17
29	-0.71	-1.18	-1.12	-1.06	-0.97	-0.85	-0.75	-0.67	-0.55	-0.39	-0.23	-0.04	0.05	0.13	0.18	0.23	0.29	0.29
30	-0.72	-1.06	-0.96	-0.99	-0.85	-0.75	-0.71	-0.58	-0.38	-0.17	0.00	0.12	0.18	0.24	0.31	0.36	0.36	0.37
31	-1.00	-1.06	-1.05	-0.94	-0.79	-0.72	-0.59	-0.37	-0.23	-0.06	0.07	0.18	0.24	0.28	0.34	0.37	0.37	0.35
32	-0.50	-0.92	-0.76	-0.67	-0.71	-0.65	-0.39	-0.17	-0.01	0.17	0.28	0.34	0.36	-0.40	-0.41	-0.39	-0.40	-0.41
33	-0.22	-0.48	-0.43	-0.56	-0.57	-0.33	-0.17	-0.04	0.10	0.26	0.35	0.41	-0.34	-0.31	-0.31	-0.32	-0.32	-0.30
34	-0.40	-0.05	-0.35	-0.50	-0.34	-0.23	-0.09	0.01	0.13	0.26	0.38	-0.35	-0.34	-0.34	-0.35	-0.33	-0.33	-0.30
35	0.29	-0.40	-0.40	-0.27	-0.19	-0.13	0.01	0.12	0.24	0.35	-0.37	-0.32	-0.33	-0.34	-0.32	-0.30	-0.27	-0.27
36	-0.19	-0.51	-0.43	-0.41	-0.26	-0.17	-0.04	0.05	0.18	0.34	-0.38	-0.34	-0.32	-0.31	-0.29	-0.27	-0.28	-0.30

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly real returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the real returns considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 26: Average Real Return - No Size Distinction - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.33	0.34	0.31	0.35	0.35	0.37	0.37	0.34	0.35	0.35	0.30	0.31	0.33	0.34	0.30	0.32	0.29	0.27
2	0.16	0.14	0.14	0.18	0.19	0.23	0.23	0.21	0.21	0.15	0.15	0.18	0.16	0.14	0.15	0.15	0.12	0.10
3	-0.10	-0.11	-0.07	-0.05	-0.01	0.01	0.00	-0.02	-0.05	-0.05	-0.06	-0.04	-0.04	-0.03	-0.03	-0.07	-0.07	-0.05
4	-0.20	-0.19	-0.17	-0.12	-0.10	-0.10	-0.11	-0.15	-0.16	-0.17	-0.19	-0.17	-0.15	-0.13	-0.16	-0.17	-0.14	-0.12
5	-0.19	-0.19	-0.15	-0.12	-0.09	-0.11	-0.14	-0.17	-0.16	-0.17	-0.19	-0.15	-0.14	-0.15	-0.17	-0.14	-0.12	-0.08
6	-0.35	-0.33	-0.31	-0.29	-0.29	-0.30	-0.33	-0.36	-0.34	-0.34	-0.34	-0.31	-0.32	-0.32	-0.29	-0.27	-0.23	-0.19
7	-0.23	-0.22	-0.22	-0.22	-0.23	-0.25	-0.28	-0.28	-0.28	-0.28	-0.26	-0.26	-0.26	-0.22	-0.20	-0.15	-0.09	-0.05
8	-0.25	-0.24	-0.25	-0.26	-0.26	-0.26	-0.25	-0.27	-0.25	-0.25	-0.27	-0.26	-0.24	-0.22	-0.17	-0.12	-0.09	-0.05
9	-0.17	-0.17	-0.20	-0.20	-0.21	-0.20	-0.19	-0.20	-0.19	-0.21	-0.21	-0.18	-0.16	-0.12	-0.07	-0.03	0.00	0.04
10	-0.06	-0.07	-0.09	-0.12	-0.10	-0.10	-0.09	-0.09	-0.11	-0.13	-0.11	-0.08	-0.03	0.03	0.06	0.10	0.14	0.19
11	-0.14	-0.15	-0.17	-0.17	-0.14	-0.12	-0.14	-0.17	-0.17	-0.17	-0.13	-0.06	-0.02	0.03	0.08	0.12	0.16	0.17
12	-0.27	-0.27	-0.25	-0.24	-0.21	-0.19	-0.23	-0.25	-0.23	-0.20	-0.13	-0.09	-0.03	0.03	0.07	0.12	0.12	0.12
13	-0.22	-0.21	-0.21	-0.21	-0.19	-0.20	-0.22	-0.21	-0.19	-0.13	-0.09	-0.03	0.04	0.08	0.12	0.13	0.12	0.12
14	-0.23	-0.21	-0.20	-0.19	-0.20	-0.20	-0.18	-0.17	-0.11	-0.09	-0.04	0.03	0.06	0.11	0.12	0.12	0.10	0.10
15	-0.20	-0.18	-0.17	-0.17	-0.16	-0.14	-0.13	-0.08	-0.06	-0.01	0.06	0.09	0.14	0.17	0.15	0.14	0.12	0.12
16	-0.17	-0.16	-0.16	-0.16	-0.13	-0.11	-0.05	-0.04	0.01	0.06	0.09	0.15	0.17	0.18	0.16	0.15	0.14	0.14
17	-0.15	-0.16	-0.15	-0.12	-0.07	0.00	0.02	0.07	0.13	0.16	0.21	0.25	0.26	0.26	0.24	0.24	0.21	0.21
18	-0.19	-0.15	-0.12	-0.09	-0.02	0.01	0.06	0.10	0.12	0.17	0.20	0.21	0.22	0.23	0.22	0.20	0.19	0.18
19	-0.24	-0.20	-0.14	-0.07	-0.01	0.04	0.10	0.12	0.17	0.18	0.19	0.20	0.21	0.21	0.20	0.18	0.16	0.19
20	-0.06	0.00	0.07	0.12	0.16	0.22	0.25	0.30	0.30	0.30	0.31	0.31	0.32	0.32	0.31	0.29	0.30	0.31
21	-0.03	0.04	0.09	0.15	0.22	0.24	0.27	0.28	0.28	0.28	0.27	0.28	0.28	0.27	0.26	0.28	0.28	0.30
22	-0.01	0.04	0.10	0.15	0.17	0.23	0.25	0.24	0.24	0.22	0.22	0.23	0.23	0.23	0.25	0.25	0.27	0.29
23	0.05	0.11	0.18	0.19	0.25	0.26	0.25	0.24	0.21	0.20	0.21	0.21	0.21	0.24	0.24	0.26	0.29	0.30
24	0.00	0.07	0.07	0.12	0.14	0.14	0.14	0.13	0.11	0.10	0.11	0.12	0.14	0.15	0.18	0.21	0.23	0.26
25	0.03	0.05	0.10	0.13	0.14	0.14	0.11	0.09	0.09	0.08	0.08	0.13	0.13	0.16	0.18	0.21	0.23	0.25
26	0.02	0.09	0.11	0.12	0.13	0.12	0.10	0.08	0.07	0.07	0.12	0.12	0.12	0.16	0.19	0.22	0.24	0.26
27	0.15	0.17	0.16	0.16	0.15	0.14	0.13	0.12	0.11	0.11	0.11	0.11	0.14	0.17	0.18	0.20	0.24	0.24
28	0.20	0.18	0.19	0.19	0.20	0.19	0.17	0.15	0.17	0.17	0.18	0.18	0.20	0.23	0.23	0.25	0.24	0.26
29	0.31	0.31	0.30	0.29	0.29	0.28	0.27	0.28	0.27	0.26	0.26	0.27	0.28	0.28	0.27	0.27	0.27	0.29
30	0.36	0.34	0.35	0.35	0.34	0.33	0.36	0.33	0.31	0.30	0.32	0.32	0.31	0.33	0.31	0.31	0.33	0.33
31	0.37	0.39	0.39	0.38	0.39	-0.40	-0.40	0.39	0.40	0.40	0.40	0.38	0.39	0.40	0.38	0.39	0.38	0.37
32	-0.40	-0.39	-0.40	-0.40	-0.37	-0.37	-0.38	-0.37	-0.37	-0.38	-0.39	-0.39	-0.39	-0.39	-0.38	-0.39	-0.41	0.41
33	-0.27	-0.29	-0.30	-0.25	-0.25	-0.25	-0.27	-0.30	-0.32	-0.35	-0.34	-0.33	-0.33	-0.32	-0.34	-0.34	-0.36	-0.39
34	-0.29	-0.30	-0.29	-0.28	-0.27	-0.26	-0.27	-0.30	-0.33	-0.34	-0.34	-0.34	-0.33	-0.32	-0.33	-0.33	-0.37	-0.38
35	-0.29	-0.27	-0.26	-0.26	-0.25	-0.25	-0.25	-0.29	-0.31	-0.33	-0.35	-0.33	-0.32	-0.32	-0.31	-0.34	-0.35	-0.37
36	-0.28	-0.27	-0.28	-0.27	-0.27	-0.28	-0.31	-0.34	-0.36	-0.37	-0.35	-0.34	-0.35	-0.33	-0.35	-0.36	-0.38	-0.39

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly real returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the real returns considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 27: Average Real Return - Small Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	0.03	0.78	0.51	-0.07	-0.06	-0.02	-0.26	-0.19	-0.34	-0.39	-0.33	-0.37	0.35	0.33	0.28	0.30	0.24	0.28
2	0.87	1.36	0.68	0.41	0.33	-0.05	-0.22	-0.35	0.34	0.35	-0.39	0.30	0.25	0.14	0.09	0.12	0.08	0.12
3	1.80	0.88	0.73	0.17	0.08	-0.18	0.20	0.13	0.29	0.16	0.13	0.01	-0.18	-0.17	-0.21	-0.15	-0.05	-0.09
4	0.43	-0.03	0.38	0.06	0.02	-0.35	-0.49	-0.40	-0.40	-0.48	-0.51	-0.63	-0.76	-0.82	-0.76	-0.68	-0.65	-0.64
5	1.24	0.48	-0.13	-0.31	0.32	0.11	0.08	0.12	0.02	-0.06	-0.14	-0.30	-0.49	-0.57	-0.47	-0.44	-0.41	-0.38
6	0.73	0.17	-0.24	-0.59	-0.64	-0.51	-0.57	-0.52	-0.57	-0.65	-0.69	-0.79	-0.93	-0.93	-0.87	-0.80	-0.75	-0.72
7	0.07	0.41	-0.03	-0.38	-0.17	-0.38	-0.58	-0.54	-0.57	-0.65	-0.74	-0.74	-0.82	-0.77	-0.68	-0.62	-0.55	-0.57
8	0.06	0.09	-0.51	-0.36	-0.54	-0.70	-0.77	-0.76	-0.76	-0.83	-0.78	-0.79	-0.70	-0.70	-0.62	-0.59	-0.54	-0.48
9	-0.22	-0.41	-0.48	-0.79	-0.97	-0.96	-0.88	-0.85	-0.98	-0.99	-0.93	-0.90	-0.90	-0.81	-0.72	-0.69	-0.67	-0.65
10	0.32	0.31	0.01	-0.45	-0.71	-0.82	-0.78	-0.82	-0.84	-0.84	-0.65	-0.71	-0.64	-0.54	-0.52	-0.49	-0.48	-0.47
11	-0.37	0.01	-0.13	-0.43	-0.64	-0.70	-0.68	-0.64	-0.64	-0.52	-0.47	-0.49	-0.38	-0.36	-0.31	-0.26	-0.26	-0.27
12	0.21	-0.01	-0.45	-0.76	-1.02	-1.04	-0.88	-0.84	-0.81	-0.79	-0.70	-0.64	-0.59	-0.55	-0.49	-0.45	-0.43	-0.46
13	0.25	-0.50	-0.82	-1.03	-1.07	-1.01	-0.90	-0.70	-0.74	-0.74	-0.68	-0.64	-0.58	-0.52	-0.49	-0.47	-0.49	-0.45
14	-0.40	-0.87	-1.00	-1.09	-1.06	-0.99	-0.91	-0.92	-0.87	-0.80	-0.63	-0.56	-0.49	-0.43	-0.38	-0.37	-0.34	-0.32
15	0.39	-0.49	-0.52	-0.76	-0.99	-1.00	-0.98	-0.97	-0.88	-0.83	-0.66	-0.59	-0.51	-0.44	-0.41	-0.36	-0.30	-0.28
16	-0.02	-0.72	-0.76	-1.11	-1.13	-1.15	-1.11	-1.06	-1.00	-0.90	-0.74	-0.63	-0.52	-0.48	-0.39	-0.33	-0.28	-0.21
17	-0.41	-0.77	-1.11	-1.25	-1.29	-1.21	-1.12	-0.95	-0.89	-0.76	-0.61	-0.48	-0.40	-0.32	-0.33	-0.28	-0.20	-0.14
18	-0.11	-1.09	-1.28	-1.27	-1.26	-1.21	-1.14	-1.06	-1.03	-0.83	-0.70	-0.54	-0.49	-0.45	-0.39	-0.33	-0.22	-0.14
19	-0.32	-1.07	-0.90	-0.98	-0.91	-0.98	-1.01	-0.96	-0.84	-0.69	-0.59	-0.47	-0.42	-0.39	-0.32	-0.20	-0.11	-0.01
20	0.05	-0.78	-0.58	-0.59	-0.74	-0.86	-0.85	-0.64	-0.47	-0.36	-0.21	-0.12	-0.08	-0.01	0.04	0.11	0.16	0.18
21	0.01	-0.47	-0.59	-0.68	-0.74	-0.86	-0.87	-0.71	-0.77	-0.64	-0.50	-0.42	-0.33	-0.19	-0.10	-0.03	0.00	0.07
22	0.36	-0.01	-0.15	-0.37	-0.54	-0.69	-0.79	-0.69	-0.56	-0.43	-0.37	-0.32	-0.25	-0.13	-0.11	-0.06	0.05	0.15
23	0.07	0.07	-0.10	-0.48	-0.65	-0.77	-0.89	-0.78	-0.82	-0.72	-0.56	-0.49	-0.37	-0.34	-0.30	-0.16	-0.02	0.03
24	-0.34	0.08	-0.46	-0.92	-0.81	-0.91	-0.96	-0.89	-0.88	-0.78	-0.56	-0.51	-0.51	-0.47	-0.37	-0.23	-0.13	-0.03
25	-0.35	-0.42	-0.87	-1.11	-1.33	-1.42	-1.44	-1.41	-1.28	-0.97	-0.73	-0.69	-0.66	-0.51	-0.37	-0.26	-0.16	-0.14
26	-0.23	-0.94	-1.28	-1.58	-1.61	-1.62	-1.63	-1.56	-1.35	-1.06	-0.94	-0.84	-0.65	-0.52	-0.39	-0.27	-0.19	-0.17
27	-0.27	-1.05	-1.48	-1.78	-1.75	-1.72	-1.65	-1.33	-1.14	-0.97	-0.82	-0.61	-0.43	-0.31	-0.18	-0.05	0.01	0.03
28	-0.61	-1.29	-1.48	-1.81	-1.82	-1.75	-1.66	-1.31	-1.06	-0.90	-0.69	-0.47	-0.31	-0.16	0.00	0.05	0.10	0.14
29	-1.24	-1.33	-1.53	-1.60	-1.64	-1.60	-1.48	-1.38	-1.16	-0.87	-0.60	-0.40	-0.21	-0.08	-0.02	0.02	0.08	0.08
30	-0.11	-1.00	-1.25	-1.37	-1.33	-1.33	-1.28	-1.07	-0.73	-0.42	-0.26	-0.08	0.08	0.12	0.20	0.28	0.27	0.24
31	-0.65	-1.32	-1.44	-1.39	-1.28	-1.42	-1.34	-0.94	-0.73	-0.53	-0.26	-0.06	0.04	0.13	0.18	0.22	0.19	0.14
32	-1.48	-1.47	-1.41	-1.45	-1.51	-1.51	-1.01	-0.60	-0.37	-0.09	0.12	0.31	0.34	0.41	-0.40	-0.41	0.37	0.35
33	-1.16	-0.75	-0.93	-1.25	-1.24	-0.88	-0.63	-0.44	-0.15	0.09	0.27	0.38	-0.39	-0.34	-0.34	-0.31	-0.30	-0.28
34	-0.45	-0.99	-1.57	-1.71	-1.10	-0.92	-0.68	-0.37	-0.05	0.13	0.33	-0.36	-0.33	-0.34	-0.35	-0.35	-0.33	-0.28
35	-0.84	-1.54	-1.87	-1.51	-1.20	-0.94	-0.57	-0.26	-0.03	0.19	0.33	0.40	0.40	0.37	0.36	0.40	-0.39	-0.39
36	-1.47	-1.89	-1.67	-1.47	-0.97	-0.55	-0.23	0.00	0.25	0.35	-0.36	-0.33	-0.37	-0.38	-0.37	-0.35	-0.39	-0.39

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly real returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the real returns considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 28: Average Real Return - Small Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.26	0.31	0.24	0.32	0.30	0.30	0.35	0.33	0.37	0.36	0.27	0.28	0.33	0.36	0.30	0.30	0.27	0.22
2	0.10	0.08	0.08	0.11	0.13	0.18	0.15	0.15	0.18	0.16	0.18	0.24	0.28	0.24	0.24	0.23	0.15	0.12
3	-0.12	-0.09	-0.07	-0.05	-0.04	0.01	-0.04	0.00	0.00	0.02	-0.01	0.01	-0.01	0.02	-0.01	-0.09	-0.12	-0.09
4	-0.64	-0.62	-0.60	-0.56	-0.55	-0.50	-0.49	-0.51	-0.51	-0.50	-0.51	-0.50	-0.45	-0.44	-0.51	-0.55	-0.51	-0.48
5	-0.35	-0.37	-0.36	-0.37	-0.37	-0.32	-0.34	-0.37	-0.33	-0.35	-0.37	-0.30	-0.27	-0.32	-0.36	-0.31	-0.29	-0.22
6	-0.69	-0.69	-0.68	-0.68	-0.69	-0.68	-0.68	-0.69	-0.63	-0.63	-0.60	-0.55	-0.60	-0.61	-0.58	-0.55	-0.46	-0.38
7	-0.54	-0.57	-0.58	-0.61	-0.60	-0.59	-0.59	-0.56	-0.51	-0.46	-0.42	-0.46	-0.48	-0.45	-0.41	-0.32	-0.23	-0.17
8	-0.47	-0.46	-0.47	-0.49	-0.51	-0.51	-0.48	-0.46	-0.41	-0.37	-0.43	-0.44	-0.43	-0.40	-0.32	-0.22	-0.17	-0.11
9	-0.58	-0.56	-0.57	-0.60	-0.58	-0.52	-0.50	-0.47	-0.42	-0.48	-0.50	-0.47	-0.45	-0.37	-0.34	-0.28	-0.21	-0.12
10	-0.44	-0.45	-0.46	-0.46	-0.38	-0.34	-0.34	-0.30	-0.33	-0.36	-0.34	-0.29	-0.24	-0.18	-0.11	-0.04	0.03	0.10
11	-0.26	-0.26	-0.28	-0.25	-0.19	-0.17	-0.17	-0.18	-0.18	-0.15	-0.11	-0.03	0.00	0.04	0.10	0.17	0.23	0.26
12	-0.43	-0.40	-0.33	-0.30	-0.25	-0.24	-0.28	-0.32	-0.28	-0.25	-0.15	-0.09	-0.03	0.04	0.09	0.17	0.16	0.13
13	-0.41	-0.37	-0.32	-0.28	-0.22	-0.19	-0.22	-0.21	-0.16	-0.13	-0.08	0.04	0.11	0.12	0.19	0.20	0.17	0.16
14	-0.29	-0.25	-0.17	-0.16	-0.11	-0.13	-0.10	-0.05	0.02	0.04	0.05	0.14	0.18	0.26	0.27	0.25	0.20	0.16
15	-0.25	-0.17	-0.12	-0.12	-0.12	-0.09	-0.07	0.04	0.04	0.05	0.12	0.18	0.24	0.27	0.25	0.22	0.16	0.14
16	-0.16	-0.07	-0.06	-0.05	0.00	0.04	0.14	0.15	0.19	0.23	0.26	0.36	0.38	0.40	0.38	0.35	0.33	0.33
17	-0.08	0.00	0.04	0.09	0.17	0.27	0.31	0.35	0.39	0.39	-0.36	-0.30	-0.29	-0.29	-0.29	-0.33	-0.38	0.41
18	-0.05	-0.03	0.04	0.11	0.24	0.27	0.32	0.37	0.37	-0.39	-0.36	-0.33	-0.33	-0.32	-0.35	-0.38	0.40	0.39
19	0.03	0.09	0.16	0.29	0.37	-0.39	-0.34	-0.36	-0.32	-0.33	-0.32	-0.31	-0.31	-0.31	-0.32	-0.34	-0.38	-0.34
20	0.25	0.32	-0.39	-0.33	-0.25	-0.19	-0.20	-0.17	-0.17	-0.21	-0.21	-0.19	-0.20	-0.20	-0.21	-0.24	-0.23	-0.23
21	0.12	0.23	0.31	0.39	-0.36	-0.37	-0.34	-0.34	-0.37	-0.38	-0.38	-0.38	-0.38	-0.36	-0.37	-0.34	-0.36	-0.33
22	0.25	0.32	-0.39	-0.34	-0.33	-0.29	-0.29	-0.32	-0.34	-0.37	-0.38	-0.37	-0.36	-0.36	-0.32	-0.32	-0.30	-0.23
23	0.10	0.19	0.31	0.34	-0.40	-0.41	0.36	0.33	0.29	0.27	0.27	0.30	0.30	0.36	0.38	0.41	-0.37	-0.33
24	-0.01	0.09	0.12	0.20	0.24	0.18	0.15	0.11	0.06	0.07	0.09	0.10	0.16	0.20	0.21	0.28	0.30	0.36
25	-0.06	-0.02	0.02	0.04	0.03	0.00	-0.03	-0.07	-0.07	-0.05	-0.05	0.04	0.06	0.08	0.13	0.16	0.19	0.24
26	-0.15	-0.11	-0.10	-0.09	-0.10	-0.11	-0.14	-0.16	-0.16	-0.15	-0.12	-0.09	-0.10	-0.07	-0.04	0.00	0.03	0.11
27	0.12	0.12	0.11	0.09	0.07	0.02	0.00	-0.01	-0.02	0.00	0.02	0.06	0.06	0.09	0.13	0.17	0.21	0.23
28	0.13	0.12	0.11	0.10	0.10	0.09	0.05	0.04	0.08	0.10	0.12	0.14	0.16	0.16	0.19	0.24	0.24	0.25
29	0.09	0.07	0.08	0.11	0.11	0.11	0.10	0.13	0.14	0.14	0.15	0.17	0.18	0.18	0.20	0.22	0.21	0.25
30	0.25	0.24	0.23	0.25	0.23	0.21	0.25	0.23	0.21	0.20	0.23	0.23	0.21	0.24	0.25	0.24	0.26	0.24
31	0.14	0.16	0.19	0.18	0.18	0.25	0.24	0.24	0.26	0.29	0.29	0.28	0.29	0.30	0.28	0.31	0.29	0.26
32	0.34	0.34	0.33	0.35	0.39	0.38	0.35	0.35	0.37	0.37	0.38	0.41	-0.40	-0.40	-0.37	-0.37	0.41	0.39
33	-0.27	-0.32	-0.34	-0.27	-0.26	-0.22	-0.21	-0.23	-0.20	-0.19	-0.17	-0.16	-0.16	-0.16	-0.19	-0.22	-0.25	-0.27
34	-0.32	-0.34	-0.34	-0.31	-0.30	-0.24	-0.22	-0.19	-0.19	-0.18	-0.19	-0.19	-0.18	-0.18	-0.20	-0.22	-0.27	-0.28
35	-0.40	-0.38	-0.38	-0.36	-0.34	-0.31	-0.34	-0.36	-0.36	-0.36	-0.37	-0.36	-0.35	-0.34	-0.34	-0.37	-0.39	-0.41
36	-0.32	-0.29	-0.34	-0.31	-0.30	-0.30	-0.33	-0.38	-0.40	-0.39	-0.38	-0.38	-0.38	-0.37	-0.40	-0.40	0.40	0.37

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly real returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the real returns considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 29: Average Real Return - Big Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.55	0.15	0.29	0.29	-0.23	-0.21	-0.29	-0.27	-0.34	-0.26	-0.14	-0.20	-0.25	-0.24	-0.28	-0.28	-0.32	-0.25
2	-0.25	0.02	-0.05	0.00	0.05	-0.01	-0.12	-0.21	-0.18	-0.12	-0.10	-0.10	-0.16	-0.21	-0.24	-0.29	-0.32	-0.29
3	-0.13	-0.15	0.00	0.03	0.18	0.05	-0.08	-0.11	-0.09	-0.09	-0.10	-0.14	-0.22	-0.28	-0.33	-0.34	-0.35	-0.35
4	0.26	-0.27	-0.08	-0.04	0.10	0.00	-0.07	-0.11	-0.15	-0.12	-0.11	-0.19	-0.25	-0.32	-0.33	-0.33	-0.37	-0.32
5	-0.01	0.21	0.29	0.19	0.19	0.10	0.04	0.00	-0.03	0.00	-0.03	-0.10	-0.20	-0.24	-0.27	-0.31	-0.32	-0.30
6	0.23	0.30	0.29	0.08	0.12	0.09	0.02	-0.03	-0.09	-0.10	-0.11	-0.22	-0.25	-0.25	-0.30	-0.30	-0.31	-0.25
7	0.46	0.30	0.23	0.14	0.21	0.08	0.03	-0.05	-0.09	-0.12	-0.16	-0.20	-0.26	-0.31	-0.33	-0.33	-0.32	-0.30
8	0.17	-0.12	-0.05	-0.06	0.00	-0.10	-0.21	-0.28	-0.31	-0.33	-0.26	-0.30	0.41	0.39	0.37	0.41	-0.41	-0.38
9	-0.32	0.38	-0.34	-0.25	-0.22	-0.32	-0.41	0.37	0.35	0.40	0.41	0.32	0.28	0.27	0.27	0.30	0.34	0.39
10	-0.37	-0.31	-0.27	-0.29	-0.27	0.37	0.24	0.17	0.28	0.29	0.24	0.19	0.17	0.21	0.22	0.28	0.29	0.31
11	-0.36	-0.39	-0.40	0.38	0.35	0.26	0.19	0.29	0.35	0.30	0.28	0.27	0.28	0.31	0.33	0.38	0.39	0.39
12	0.37	0.28	0.30	0.22	0.20	0.08	0.09	0.16	0.17	0.16	0.15	0.17	0.18	0.21	0.22	0.26	0.30	0.28
13	0.16	0.21	0.27	0.19	0.20	0.23	0.22	0.20	0.17	0.17	0.17	0.18	0.20	0.23	0.27	0.31	0.34	0.31
14	0.33	0.10	0.10	0.06	0.21	0.20	0.11	0.05	0.03	0.06	0.08	0.10	0.11	0.14	0.16	0.20	0.20	0.18
15	0.16	0.03	-0.02	0.17	0.23	0.18	0.08	0.10	0.15	0.17	0.17	0.19	0.21	0.24	0.24	0.25	0.22	0.22
16	-0.25	-0.22	-0.03	0.09	0.15	0.10	0.01	0.08	0.09	0.10	0.15	0.17	0.18	0.20	0.19	0.18	0.19	0.15
17	-0.38	-0.13	0.08	0.04	0.08	-0.01	0.00	0.02	0.06	0.11	0.14	0.16	0.17	0.18	0.15	0.13	0.11	0.09
18	-0.36	-0.15	-0.05	-0.09	-0.09	-0.13	-0.12	-0.05	0.00	0.06	0.09	0.10	0.12	0.10	0.08	0.03	0.02	0.02
19	-0.34	-0.21	-0.11	-0.18	-0.13	-0.14	-0.12	-0.04	0.00	0.04	0.07	0.09	0.09	0.09	0.07	0.04	0.03	0.02
20	-0.44	-0.28	-0.31	-0.26	-0.25	-0.23	-0.18	-0.12	-0.05	-0.02	0.03	0.02	0.03	0.03	0.02	0.00	0.00	0.00
21	-0.33	-0.23	-0.15	-0.14	-0.07	-0.12	-0.07	-0.05	-0.01	-0.02	0.00	0.03	0.02	0.02	0.02	-0.01	0.01	0.01
22	-0.33	-0.24	-0.18	-0.21	-0.15	-0.17	-0.17	-0.15	-0.14	-0.12	-0.04	-0.04	-0.03	-0.06	-0.08	-0.07	-0.07	-0.07
23	-0.10	-0.06	-0.12	-0.16	-0.08	-0.15	-0.19	-0.19	-0.14	-0.11	-0.09	-0.06	-0.06	-0.08	-0.07	-0.08	-0.09	-0.10
24	0.18	0.16	0.02	-0.06	-0.06	-0.18	-0.19	-0.22	-0.17	-0.15	-0.12	-0.12	-0.10	-0.10	-0.10	-0.11	-0.12	-0.13
25	-0.03	-0.16	-0.17	-0.21	-0.18	-0.26	-0.25	-0.25	-0.21	-0.18	-0.18	-0.16	-0.10	-0.09	-0.10	-0.11	-0.12	-0.12
26	-0.35	-0.20	-0.23	-0.30	-0.29	-0.29	-0.27	-0.27	-0.24	-0.22	-0.20	-0.18	-0.13	-0.13	-0.15	-0.17	-0.16	-0.13
27	-0.14	-0.24	-0.31	-0.42	-0.36	-0.36	-0.35	-0.33	-0.32	-0.31	-0.27	-0.24	-0.19	-0.19	-0.19	-0.16	-0.14	-0.14
28	-0.59	-0.45	-0.53	-0.55	-0.46	-0.43	-0.42	-0.39	-0.36	-0.28	-0.22	-0.19	-0.16	-0.16	-0.13	-0.11	-0.12	-0.10
29	-0.29	-0.42	-0.48	-0.44	-0.43	-0.44	-0.41	-0.43	-0.33	-0.27	-0.23	-0.21	-0.17	-0.14	-0.12	-0.12	-0.10	-0.09
30	-0.57	-0.48	-0.41	-0.45	-0.44	-0.45	-0.43	-0.37	-0.29	-0.25	-0.21	-0.18	-0.13	-0.10	-0.08	-0.08	-0.06	-0.04
31	-0.44	-0.53	-0.51	-0.58	-0.57	-0.57	-0.45	-0.37	-0.31	-0.26	-0.22	-0.16	-0.11	-0.09	-0.06	-0.05	-0.03	0.01
32	-0.78	-0.68	-0.57	-0.52	-0.50	-0.39	-0.35	-0.30	-0.24	-0.21	-0.13	-0.06	-0.02	0.02	0.05	0.06	0.11	0.13
33	-0.65	-0.58	-0.47	-0.46	-0.36	-0.34	-0.32	-0.29	-0.26	-0.18	-0.09	-0.04	0.00	0.03	0.06	0.10	0.13	0.15
34	-0.07	-0.23	-0.22	-0.19	-0.13	-0.16	-0.16	-0.14	-0.07	0.01	0.07	0.11	0.16	0.18	0.23	0.24	0.26	0.24
35	-0.39	-0.30	-0.17	-0.13	-0.14	-0.15	-0.20	-0.13	0.00	0.05	0.12	0.16	0.21	0.26	0.29	0.31	0.31	0.31
36	-0.21	-0.08	-0.14	-0.12	-0.12	-0.15	-0.14	-0.02	0.10	0.15	0.22	0.26	0.32	0.33	0.37	0.35	0.36	0.36

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly real returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the real returns considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 30: Average Real Return - Big Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	-0.26	-0.30	-0.30	-0.28	-0.27	-0.26	-0.25	-0.27	-0.29	-0.33	-0.36	-0.40	-0.40	-0.40	0.41	0.41	0.40	-0.41
2	-0.32	-0.36	-0.36	-0.34	-0.31	-0.29	-0.30	-0.33	-0.38	0.40	0.38	0.35	0.33	0.32	0.34	0.33	0.36	0.36
3	-0.39	-0.40	-0.37	-0.35	-0.31	-0.30	-0.30	-0.35	0.41	0.36	0.33	0.31	0.29	0.30	0.31	0.32	0.34	0.35
4	-0.35	-0.37	-0.34	-0.29	-0.27	-0.28	-0.33	-0.41	0.37	0.32	0.29	0.25	0.24	0.24	0.25	0.27	0.29	0.31
5	-0.27	-0.30	-0.26	-0.23	-0.20	-0.23	-0.30	-0.37	0.39	0.34	0.29	0.26	0.25	0.26	0.26	0.28	0.29	0.29
6	-0.28	-0.29	-0.28	-0.26	-0.28	-0.33	-0.38	0.38	0.32	0.26	0.25	0.22	0.21	0.24	0.23	0.23	0.22	0.23
7	-0.30	-0.33	-0.34	-0.34	-0.39	0.38	0.32	0.26	0.19	0.17	0.15	0.14	0.14	0.13	0.13	0.13	0.11	0.13
8	-0.36	-0.39	-0.40	0.41	0.39	0.35	0.30	0.24	0.20	0.17	0.16	0.13	0.14	0.13	0.12	0.12	0.13	0.16
9	0.41	0.37	0.33	0.32	0.28	0.24	0.18	0.14	0.10	0.05	0.05	0.05	0.05	0.04	0.04	0.06	0.08	0.12
10	0.31	0.26	0.23	0.19	0.15	0.11	0.09	0.05	0.00	-0.03	-0.03	-0.03	-0.03	-0.03	-0.03	-0.01	0.02	0.05
11	0.38	0.34	0.30	0.26	0.21	0.19	0.15	0.10	0.07	0.03	0.02	0.00	0.01	0.01	0.02	0.04	0.09	0.12
12	0.26	0.22	0.19	0.15	0.13	0.11	0.07	0.04	0.00	-0.03	-0.05	-0.06	-0.06	-0.03	-0.01	0.02	0.05	0.09
13	0.28	0.24	0.20	0.18	0.16	0.13	0.10	0.04	0.01	-0.02	-0.04	-0.05	-0.03	0.00	0.03	0.06	0.09	0.12
14	0.16	0.12	0.10	0.07	0.07	0.04	0.01	-0.03	-0.05	-0.07	-0.07	-0.06	-0.04	-0.01	0.01	0.03	0.06	0.09
15	0.21	0.15	0.12	0.10	0.08	0.05	0.03	-0.01	-0.03	-0.03	-0.02	-0.02	0.00	0.02	0.04	0.07	0.10	0.13
16	0.13	0.10	0.07	0.05	0.02	0.01	0.00	-0.03	-0.05	-0.04	-0.02	-0.01	0.02	0.04	0.06	0.07	0.11	0.13
17	0.09	0.05	0.02	0.01	-0.01	-0.04	-0.05	-0.06	-0.06	-0.04	-0.03	-0.02	0.00	0.03	0.04	0.07	0.10	0.11
18	0.00	-0.02	-0.04	-0.06	-0.09	-0.11	-0.12	-0.12	-0.10	-0.09	-0.07	-0.06	-0.03	-0.01	0.02	0.04	0.07	0.08
19	0.00	-0.04	-0.05	-0.08	-0.10	-0.10	-0.10	-0.08	-0.08	-0.07	-0.04	-0.03	-0.01	0.01	0.03	0.04	0.06	0.09
20	-0.01	-0.03	-0.06	-0.07	-0.09	-0.07	-0.05	-0.05	-0.04	-0.03	0.00	0.00	0.03	0.05	0.05	0.06	0.08	0.10
21	0.01	-0.03	-0.05	-0.07	-0.06	-0.04	-0.03	-0.03	-0.02	0.00	0.03	0.04	0.06	0.06	0.07	0.08	0.10	0.12
22	-0.07	-0.09	-0.11	-0.09	-0.08	-0.06	-0.03	-0.02	0.01	0.02	0.05	0.06	0.06	0.08	0.08	0.09	0.12	0.13
23	-0.11	-0.13	-0.12	-0.11	-0.10	-0.08	-0.05	-0.03	-0.02	0.00	0.02	0.01	0.03	0.02	0.03	0.04	0.07	0.10
24	-0.12	-0.11	-0.10	-0.07	-0.04	0.00	0.03	0.04	0.05	0.07	0.08	0.09	0.09	0.11	0.12	0.13	0.16	0.18
25	-0.10	-0.09	-0.07	-0.05	-0.02	0.02	0.04	0.04	0.05	0.05	0.08	0.08	0.08	0.10	0.10	0.12	0.14	0.16
26	-0.12	-0.11	-0.09	-0.07	-0.05	-0.03	-0.01	0.00	0.02	0.03	0.05	0.05	0.06	0.08	0.09	0.12	0.14	0.16
27	-0.12	-0.09	-0.06	-0.03	-0.01	0.01	0.02	0.03	0.05	0.06	0.07	0.08	0.09	0.12	0.13	0.15	0.18	0.20
28	-0.09	-0.07	-0.04	-0.02	0.00	0.01	0.02	0.02	0.02	0.02	0.04	0.03	0.05	0.08	0.09	0.11	0.13	0.15
29	-0.07	-0.03	-0.02	0.00	0.01	0.03	0.04	0.04	0.03	0.04	0.04	0.05	0.08	0.09	0.10	0.12	0.14	0.17
30	-0.01	0.02	0.03	0.03	0.05	0.05	0.05	0.06	0.05	0.05	0.06	0.07	0.07	0.09	0.10	0.11	0.15	0.17
31	0.04	0.06	0.07	0.08	0.10	0.10	0.10	0.11	0.10	0.11	0.12	0.13	0.13	0.15	0.17	0.18	0.20	0.23
32	0.16	0.16	0.16	0.17	0.18	0.18	0.17	0.16	0.15	0.15	0.15	0.16	0.17	0.19	0.20	0.21	0.24	0.25
33	0.17	0.17	0.17	0.18	0.19	0.20	0.17	0.16	0.16	0.17	0.18	0.20	0.21	0.22	0.23	0.25	0.27	0.27
34	0.23	0.22	0.21	0.22	0.23	0.22	0.21	0.20	0.19	0.19	0.20	0.21	0.21	0.22	0.23	0.24	0.25	0.26
35	0.30	0.27	0.26	0.27	0.26	0.25	0.24	0.22	0.23	0.24	0.24	0.24	0.24	0.25	0.27	0.27	0.28	0.29
36	0.33	0.31	0.31	0.29	0.28	0.26	0.26	0.25	0.26	0.27	0.27	0.27	0.28	0.30	0.30	0.30	0.31	0.33

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The monthly real returns of the 1296 strategies are shown as an average between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the real returns considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

D Appendix D: Robustness - Tables

Table 31: Fama & French Alphas Regressions with IBOV market proxy - No size distinction - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.32	0.35	0.30	-0.23	0.00	0.04	-0.17	-0.18	0.49	-0.30	-0.13	-0.22	-0.30	-0.31	0.44	0.44	0.39	0.44
2	0.67	1.21	0.50	0.19	0.23	0.03	-0.12	-0.21	0.49	0.53	-0.23	0.48	0.42	0.33	0.26	0.26	0.22	0.26
3	0.51	0.30	-0.02	-0.17	-0.29	0.45	0.19	0.17	0.27	0.37	0.30	0.20	0.07	0.00	-0.03	0.01	0.06	0.08
4	0.21	0.11	-0.12	-0.36	-0.28	0.40	0.25	0.29	0.26	0.19	0.16	0.04	-0.07	-0.13	-0.11	-0.06	-0.05	-0.04
5	0.45	0.32	0.00	-0.10	-0.22	0.41	0.39	0.36	0.25	0.20	0.14	0.02	-0.07	-0.11	-0.08	-0.05	-0.02	0.00
6	0.23	0.46	0.24	-0.01	-0.03	-0.11	-0.19	-0.14	-0.15	-0.18	-0.20	-0.28	-0.29	-0.29	-0.26	-0.22	-0.19	-0.14
7	-0.14	-0.17	0.38	0.15	0.36	0.21	0.08	0.12	0.06	0.01	-0.03	-0.07	-0.08	-0.09	-0.06	-0.03	0.00	0.03
8	-0.03	0.43	0.14	0.26	0.13	0.00	-0.09	-0.12	-0.13	-0.15	-0.11	-0.11	-0.10	-0.09	-0.06	-0.01	0.01	0.04
9	0.19	0.34	0.43	0.23	0.13	0.07	0.00	0.03	-0.01	0.02	0.02	0.01	-0.05	-0.03	0.04	0.08	0.10	0.12
10	0.01	0.02	0.69	0.33	0.27	0.20	0.16	0.09	0.10	0.13	0.19	0.15	0.16	0.18	0.22	0.24	0.26	0.28
11	-0.04	0.64	0.41	0.15	0.02	-0.04	-0.09	-0.03	0.02	0.12	0.12	0.10	0.15	0.14	0.18	0.20	0.21	0.22
12	0.41	0.35	0.19	-0.13	-0.18	-0.19	-0.19	-0.11	-0.05	-0.07	-0.06	-0.03	-0.02	0.00	0.03	0.04	0.05	0.05
13	0.53	0.21	0.01	-0.13	-0.15	-0.13	-0.13	-0.02	-0.03	-0.01	0.00	-0.01	0.02	0.03	0.05	0.08	0.08	0.11
14	0.52	0.17	0.09	-0.02	0.10	-0.01	-0.06	-0.08	-0.08	-0.06	-0.03	-0.06	-0.02	-0.02	0.03	0.06	0.08	0.09
15	0.53	0.26	0.17	0.07	0.05	-0.01	-0.04	-0.05	0.00	-0.01	-0.02	-0.05	-0.03	0.00	0.04	0.08	0.11	0.13
16	0.33	-0.07	-0.01	-0.17	-0.19	-0.16	-0.17	-0.12	-0.11	-0.10	-0.09	-0.07	-0.03	0.01	0.06	0.12	0.16	0.16
17	-0.01	0.01	-0.08	-0.17	-0.12	-0.17	-0.09	-0.10	-0.10	-0.10	-0.04	-0.01	0.03	0.08	0.11	0.14	0.18	0.19
18	0.32	-0.07	-0.16	-0.32	-0.30	-0.27	-0.28	-0.20	-0.19	-0.08	-0.03	-0.06	-0.02	0.02	0.03	0.06	0.11	0.13
19	0.19	-0.21	-0.18	-0.22	-0.19	-0.20	-0.23	-0.18	-0.15	-0.07	-0.05	-0.10	-0.06	-0.03	0.00	0.05	0.08	0.07
20	0.15	-0.12	-0.02	0.00	-0.02	-0.10	-0.10	0.00	0.07	0.10	0.15	0.11	0.14	0.18	0.24	0.26	0.25	0.25
21	0.69	0.17	0.10	-0.04	-0.07	-0.15	-0.16	-0.10	-0.12	-0.08	-0.01	-0.03	0.03	0.12	0.18	0.15	0.18	0.25
22	0.58	0.21	0.05	-0.02	-0.07	-0.16	-0.19	-0.15	-0.15	-0.07	-0.09	-0.10	-0.01	0.07	0.08	0.10	0.19	0.25
23	0.62	0.15	0.14	-0.01	-0.13	-0.23	-0.29	-0.21	-0.18	-0.16	-0.15	-0.11	-0.02	0.00	0.04	0.13	0.22	0.34
24	0.36	0.21	0.09	-0.14	-0.30	-0.42	-0.47	-0.44	-0.39	-0.35	-0.28	-0.24	-0.20	-0.13	-0.02	0.06	0.14	0.22
25	0.42	-0.11	-0.26	-0.44	-0.53	-0.59	-0.61	-0.55	-0.48	-0.42	-0.28	-0.23	-0.14	-0.03	0.07	0.14	0.20	0.27
26	0.29	-0.17	-0.41	-0.57	-0.65	-0.66	-0.64	-0.58	-0.43	-0.30	-0.27	-0.19	-0.06	0.02	0.10	0.16	0.23	0.31
27	0.28	-0.48	-0.64	-0.83	-0.80	-0.76	-0.72	-0.55	-0.42	-0.34	-0.24	-0.10	0.03	0.14	0.21	0.27	0.36	0.40
28	-0.27	-0.77	-0.91	-0.90	-0.83	-0.76	-0.62	-0.46	-0.38	-0.29	-0.12	-0.04	0.09	0.19	0.26	0.36	0.39	0.49
29	-0.40	-0.87	-0.81	-0.72	-0.61	-0.49	-0.39	-0.31	-0.22	-0.07	0.09	0.28	0.38	0.47	0.52	0.56	0.63	0.63
30	-0.44	-0.75	-0.64	-0.64	-0.48	-0.37	-0.35	-0.24	-0.04	0.16	0.32	0.44	0.50	0.57	0.63	0.68	0.68	0.69
31	-0.71	-0.75	-0.74	-0.59	-0.44	-0.37	-0.25	-0.05	0.08	0.25	0.38	0.48	0.55	0.59	0.65	0.68	0.68	0.66
32	-0.21	-0.59	-0.44	-0.33	-0.36	-0.30	-0.05	0.18	0.33	0.51	0.61	0.67	0.69	-0.07	-0.08	-0.06	-0.07	-0.08
33	0.11	-0.15	-0.10	-0.22	-0.23	0.02	0.16	0.30	0.44	0.59	0.67	0.72	-0.02	0.00	0.00	-0.02	-0.01	0.01
34	-0.11	0.26	-0.04	-0.18	0.00	0.10	0.25	0.36	0.47	0.60	0.71	-0.02	-0.01	-0.02	-0.04	-0.03	-0.03	0.01
35	0.63	-0.09	-0.11	0.07	0.14	0.22	0.37	0.47	0.60	0.69	-0.03	0.01	-0.01	-0.02	-0.02	0.00	0.04	0.04
36	0.09	-0.22	-0.15	-0.11	0.07	0.17	0.30	0.38	0.51	0.67	-0.05	-0.02	0.00	0.00	0.01	0.03	0.03	0.00

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 32: Fama & French Alphas Regressions with IBOV market proxy - No size distinction - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.43	0.45	0.41	0.45	0.43	0.46	0.46	0.42	0.44	0.43	0.38	0.39	0.42	0.42	0.38	0.40	0.37	0.34
2	0.30	0.28	0.29	0.32	0.33	0.36	0.36	0.34	0.34	0.28	0.28	0.30	0.28	0.26	0.27	0.27	0.23	0.21
3	0.05	0.05	0.08	0.10	0.14	0.16	0.15	0.12	0.08	0.08	0.07	0.09	0.09	0.11	0.10	0.06	0.05	0.07
4	-0.03	-0.02	-0.01	0.04	0.06	0.06	0.04	0.00	-0.02	-0.03	-0.05	-0.03	0.00	0.01	-0.02	-0.03	-0.01	0.01
5	0.03	0.02	0.06	0.09	0.11	0.09	0.05	0.02	0.02	0.01	-0.01	0.03	0.03	0.02	0.00	0.03	0.05	0.08
6	-0.12	-0.11	-0.09	-0.08	-0.09	-0.10	-0.13	-0.16	-0.15	-0.15	-0.15	-0.13	-0.14	-0.14	-0.11	-0.09	-0.05	-0.01
7	0.05	0.05	0.05	0.04	0.03	0.00	-0.03	-0.04	-0.04	-0.05	-0.03	-0.03	-0.03	0.01	0.02	0.07	0.13	0.17
8	0.06	0.05	0.04	0.02	0.02	0.01	0.01	0.00	0.01	0.01	-0.01	0.00	0.02	0.04	0.09	0.13	0.17	0.20
9	0.14	0.12	0.09	0.08	0.07	0.08	0.08	0.08	0.08	0.05	0.04	0.07	0.09	0.14	0.18	0.22	0.26	0.30
10	0.28	0.26	0.23	0.20	0.21	0.21	0.22	0.21	0.18	0.15	0.17	0.20	0.25	0.30	0.34	0.38	0.42	0.46
11	0.21	0.19	0.16	0.16	0.19	0.20	0.18	0.13	0.12	0.13	0.16	0.23	0.27	0.32	0.37	0.41	0.45	0.45
12	0.07	0.07	0.07	0.08	0.11	0.12	0.07	0.03	0.06	0.09	0.15	0.19	0.25	0.32	0.36	0.40	0.40	0.39
13	0.13	0.13	0.13	0.13	0.14	0.12	0.09	0.09	0.11	0.17	0.21	0.27	0.34	0.38	0.42	0.42	0.41	0.40
14	0.11	0.12	0.13	0.13	0.11	0.10	0.11	0.13	0.18	0.20	0.26	0.32	0.35	0.40	0.41	0.40	0.38	0.37
15	0.14	0.15	0.16	0.14	0.14	0.16	0.17	0.22	0.23	0.29	0.36	0.39	0.44	0.46	0.45	0.43	0.41	0.41
16	0.18	0.19	0.17	0.16	0.18	0.20	0.26	0.27	0.31	0.37	0.40	0.46	0.48	0.47	0.45	0.44	0.43	0.43
17	0.21	0.19	0.18	0.21	0.25	0.33	0.35	0.40	0.45	0.48	0.53	0.56	0.57	0.57	0.55	0.54	0.51	0.50
18	0.16	0.18	0.21	0.23	0.31	0.33	0.38	0.43	0.44	0.49	0.52	0.52	0.53	0.54	0.52	0.50	0.49	0.48
19	0.09	0.13	0.18	0.26	0.31	0.37	0.43	0.44	0.49	0.50	0.50	0.51	0.51	0.51	0.50	0.48	0.46	0.49
20	0.30	0.35	0.42	0.46	0.51	0.58	0.60	0.64	0.64	0.63	0.63	0.63	0.64	0.63	0.62	0.60	0.61	0.62
21	0.32	0.39	0.44	0.50	0.57	0.59	0.62	0.62	0.60	0.60	0.59	0.59	0.59	0.58	0.56	0.59	0.58	0.60
22	0.34	0.38	0.44	0.50	0.51	0.57	0.58	0.57	0.55	0.54	0.53	0.53	0.54	0.53	0.56	0.55	0.57	0.60
23	0.38	0.45	0.52	0.52	0.57	0.58	0.57	0.55	0.51	0.50	0.50	0.51	0.51	0.54	0.54	0.56	0.59	0.60
24	0.30	0.37	0.37	0.42	0.44	0.44	0.43	0.41	0.39	0.38	0.39	0.39	0.42	0.43	0.46	0.50	0.51	0.54
25	0.36	0.38	0.43	0.45	0.46	0.45	0.42	0.39	0.38	0.38	0.38	0.42	0.42	0.45	0.48	0.50	0.51	0.53
26	0.35	0.42	0.43	0.44	0.44	0.43	0.40	0.38	0.37	0.37	0.42	0.41	0.41	0.45	0.48	0.51	0.52	0.54
27	0.48	0.48	0.47	0.46	0.45	0.44	0.43	0.41	0.40	0.40	0.40	0.40	0.42	0.45	0.46	0.48	0.51	0.51
28	0.51	0.49	0.50	0.49	0.49	0.48	0.46	0.44	0.46	0.46	0.46	0.46	0.47	0.50	0.50	0.51	0.51	0.51
29	0.63	0.63	0.62	0.60	0.60	0.59	0.58	0.58	0.57	0.55	0.55	0.56	0.56	0.55	0.54	0.53	0.52	0.54
30	0.68	0.66	0.66	0.65	0.65	0.63	0.66	0.63	0.61	0.59	0.60	0.59	0.58	0.59	0.57	0.57	0.57	0.57
31	0.68	0.69	0.68	0.68	0.68	-0.10	-0.10	0.67	0.68	0.68	0.67	0.65	0.65	0.65	0.63	0.63	0.62	0.60
32	-0.08	-0.07	-0.09	-0.08	-0.05	-0.06	-0.08	-0.07	-0.08	-0.09	-0.11	-0.12	-0.13	-0.14	-0.13	-0.15	-0.17	0.63
33	0.03	0.01	0.00	0.05	0.05	0.04	0.02	-0.02	-0.05	-0.08	-0.08	-0.08	-0.08	-0.08	-0.10	-0.11	-0.14	-0.17
34	0.01	0.00	0.01	0.01	0.02	0.03	0.01	-0.03	-0.07	-0.08	-0.09	-0.09	-0.09	-0.09	-0.11	-0.11	-0.16	-0.18
35	0.01	0.04	0.04	0.04	0.04	0.04	0.03	-0.02	-0.05	-0.07	-0.09	-0.08	-0.08	-0.09	-0.08	-0.12	-0.14	-0.16
36	0.03	0.03	0.01	0.02	0.02	0.01	-0.03	-0.07	-0.10	-0.11	-0.11	-0.10	-0.11	-0.11	-0.13	-0.15	-0.18	-0.20

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 33: Fama & French Alphas Regressions with MSCI market proxy - No size distinction - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.33	0.34	0.29	-0.23	-0.01	0.03	-0.17	-0.19	0.48	-0.30	-0.14	-0.22	-0.30	-0.32	0.43	0.44	0.39	0.44
2	0.65	1.20	0.50	0.18	0.22	0.02	-0.13	-0.22	0.48	0.52	-0.24	0.47	0.41	0.32	0.25	0.25	0.22	0.26
3	0.51	0.30	-0.03	-0.18	-0.29	0.44	0.18	0.16	0.26	0.36	0.29	0.19	0.06	0.00	-0.04	0.00	0.05	0.07
4	0.20	0.10	-0.13	-0.36	-0.29	0.39	0.23	0.27	0.25	0.18	0.15	0.03	-0.08	-0.14	-0.12	-0.07	-0.06	-0.05
5	0.43	0.31	-0.01	-0.11	-0.23	0.40	0.38	0.34	0.24	0.19	0.12	0.01	-0.09	-0.12	-0.09	-0.07	-0.03	-0.01
6	0.22	0.45	0.23	-0.02	-0.04	-0.12	-0.20	-0.15	-0.16	-0.19	-0.21	-0.29	-0.30	-0.30	-0.26	-0.23	-0.20	-0.15
7	-0.16	-0.18	0.37	0.14	0.35	0.19	0.06	0.11	0.04	-0.01	-0.05	-0.09	-0.09	-0.11	-0.07	-0.04	-0.01	0.02
8	-0.04	0.42	0.13	0.25	0.12	-0.02	-0.10	-0.13	-0.14	-0.16	-0.12	-0.12	-0.11	-0.11	-0.07	-0.02	0.00	0.03
9	0.17	0.33	0.42	0.22	0.12	0.05	-0.01	0.01	-0.03	0.00	0.01	-0.01	-0.07	-0.04	0.03	0.07	0.09	0.11
10	-0.01	0.00	0.67	0.31	0.26	0.18	0.14	0.07	0.08	0.12	0.18	0.13	0.14	0.17	0.21	0.23	0.25	0.27
11	-0.05	0.63	0.39	0.13	0.00	-0.06	-0.11	-0.05	0.01	0.10	0.10	0.09	0.13	0.13	0.17	0.19	0.20	0.20
12	0.39	0.33	0.18	-0.14	-0.19	-0.21	-0.21	-0.13	-0.07	-0.08	-0.08	-0.05	-0.04	-0.01	0.01	0.02	0.04	0.04
13	0.51	0.19	-0.01	-0.15	-0.17	-0.15	-0.15	-0.04	-0.05	-0.03	-0.02	-0.03	0.00	0.02	0.03	0.06	0.07	0.10
14	0.50	0.15	0.07	-0.03	0.08	-0.02	-0.08	-0.10	-0.10	-0.07	-0.04	-0.07	-0.04	-0.03	0.02	0.05	0.07	0.08
15	0.50	0.24	0.15	0.05	0.03	-0.03	-0.06	-0.07	-0.02	-0.03	-0.03	-0.06	-0.04	-0.01	0.03	0.07	0.10	0.12
16	0.31	-0.09	-0.03	-0.19	-0.21	-0.18	-0.19	-0.13	-0.13	-0.11	-0.11	-0.08	-0.04	0.00	0.05	0.11	0.15	0.16
17	-0.03	-0.01	-0.10	-0.20	-0.15	-0.19	-0.11	-0.12	-0.12	-0.12	-0.05	-0.02	0.02	0.06	0.10	0.13	0.17	0.19
18	0.30	-0.09	-0.18	-0.34	-0.32	-0.29	-0.29	-0.21	-0.20	-0.09	-0.04	-0.07	-0.03	0.01	0.02	0.05	0.11	0.12
19	0.17	-0.23	-0.21	-0.24	-0.22	-0.22	-0.25	-0.20	-0.16	-0.09	-0.07	-0.12	-0.07	-0.04	-0.01	0.04	0.07	0.07
20	0.13	-0.15	-0.04	-0.02	-0.04	-0.12	-0.12	-0.02	0.05	0.09	0.13	0.10	0.13	0.17	0.23	0.25	0.24	0.25
21	0.66	0.15	0.08	-0.06	-0.09	-0.17	-0.17	-0.11	-0.14	-0.10	-0.03	-0.04	0.02	0.11	0.17	0.15	0.18	0.25
22	0.56	0.19	0.03	-0.04	-0.09	-0.17	-0.21	-0.16	-0.16	-0.08	-0.10	-0.11	-0.02	0.06	0.08	0.09	0.18	0.24
23	0.60	0.13	0.13	-0.03	-0.14	-0.24	-0.30	-0.23	-0.19	-0.17	-0.16	-0.12	-0.02	-0.01	0.04	0.12	0.21	0.33
24	0.35	0.20	0.07	-0.15	-0.31	-0.43	-0.48	-0.45	-0.39	-0.35	-0.29	-0.24	-0.21	-0.14	-0.03	0.05	0.13	0.21
25	0.40	-0.12	-0.27	-0.45	-0.54	-0.60	-0.62	-0.56	-0.49	-0.42	-0.29	-0.24	-0.15	-0.04	0.06	0.13	0.19	0.27
26	0.28	-0.19	-0.42	-0.58	-0.66	-0.67	-0.65	-0.59	-0.44	-0.31	-0.28	-0.20	-0.07	0.01	0.10	0.15	0.22	0.31
27	0.27	-0.49	-0.65	-0.84	-0.81	-0.77	-0.73	-0.56	-0.43	-0.35	-0.25	-0.11	0.02	0.13	0.21	0.26	0.35	0.39
28	-0.28	-0.78	-0.92	-0.91	-0.84	-0.77	-0.63	-0.47	-0.38	-0.30	-0.13	-0.05	0.08	0.18	0.26	0.36	0.38	0.48
29	-0.40	-0.87	-0.81	-0.72	-0.62	-0.50	-0.39	-0.32	-0.23	-0.07	0.08	0.28	0.37	0.46	0.51	0.55	0.62	0.62
30	-0.45	-0.75	-0.65	-0.65	-0.49	-0.38	-0.36	-0.25	-0.05	0.15	0.31	0.43	0.49	0.56	0.62	0.67	0.68	0.68
31	-0.72	-0.75	-0.74	-0.60	-0.44	-0.38	-0.26	-0.05	0.07	0.24	0.37	0.47	0.55	0.59	0.64	0.67	0.67	0.65
32	-0.21	-0.59	-0.45	-0.33	-0.37	-0.31	-0.06	0.17	0.32	0.50	0.60	0.66	0.68	-0.08	-0.09	-0.07	-0.08	-0.09
33	0.11	-0.16	-0.11	-0.23	-0.24	0.01	0.15	0.29	0.43	0.58	0.66	0.71	-0.03	-0.01	-0.01	-0.03	-0.02	0.00
34	-0.11	0.25	-0.05	-0.19	-0.01	0.09	0.23	0.34	0.46	0.59	0.69	-0.03	-0.02	-0.03	-0.05	-0.04	-0.04	0.00
35	0.62	-0.10	-0.12	0.05	0.13	0.21	0.35	0.46	0.59	0.68	-0.04	0.00	-0.02	-0.04	-0.03	-0.01	0.02	0.02
36	0.07	-0.23	-0.16	-0.12	0.05	0.16	0.28	0.37	0.50	0.66	-0.06	-0.03	-0.02	-0.01	0.00	0.02	0.02	-0.01

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 34: Fama & French Alphas Regressions with MSCI market proxy - No size distinction - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.43	0.45	0.41	0.44	0.43	0.46	0.45	0.42	0.44	0.43	0.38	0.39	0.42	0.42	0.38	0.40	0.37	0.34
2	0.29	0.27	0.28	0.31	0.32	0.36	0.35	0.34	0.34	0.28	0.27	0.30	0.28	0.26	0.27	0.26	0.23	0.21
3	0.04	0.04	0.07	0.09	0.13	0.15	0.14	0.12	0.08	0.08	0.07	0.09	0.08	0.11	0.10	0.06	0.04	0.07
4	-0.04	-0.03	-0.01	0.03	0.05	0.05	0.04	-0.01	-0.02	-0.04	-0.05	-0.04	-0.01	0.01	-0.02	-0.04	-0.01	0.00
5	0.02	0.02	0.05	0.09	0.10	0.08	0.05	0.01	0.01	0.00	-0.01	0.02	0.03	0.02	-0.01	0.02	0.04	0.08
6	-0.13	-0.12	-0.10	-0.09	-0.09	-0.11	-0.14	-0.17	-0.15	-0.15	-0.16	-0.13	-0.14	-0.15	-0.11	-0.09	-0.05	-0.02
7	0.04	0.04	0.04	0.03	0.02	-0.01	-0.04	-0.05	-0.04	-0.05	-0.03	-0.04	-0.04	0.01	0.02	0.07	0.12	0.16
8	0.04	0.04	0.03	0.01	0.01	0.01	0.01	-0.01	0.01	0.01	-0.01	-0.01	0.01	0.03	0.08	0.13	0.16	0.20
9	0.13	0.12	0.08	0.07	0.06	0.07	0.08	0.07	0.07	0.05	0.04	0.07	0.09	0.13	0.18	0.22	0.25	0.29
10	0.27	0.25	0.22	0.19	0.20	0.20	0.21	0.20	0.17	0.15	0.16	0.19	0.25	0.30	0.33	0.37	0.41	0.46
11	0.20	0.18	0.16	0.15	0.18	0.19	0.17	0.13	0.12	0.12	0.16	0.23	0.26	0.31	0.36	0.41	0.45	0.45
12	0.06	0.06	0.06	0.07	0.10	0.11	0.07	0.03	0.06	0.08	0.15	0.19	0.25	0.31	0.35	0.40	0.39	0.38
13	0.12	0.12	0.12	0.12	0.13	0.11	0.08	0.09	0.11	0.17	0.20	0.26	0.33	0.38	0.41	0.42	0.40	0.40
14	0.10	0.11	0.12	0.13	0.11	0.09	0.11	0.12	0.18	0.19	0.25	0.32	0.35	0.40	0.40	0.39	0.37	0.37
15	0.13	0.15	0.15	0.14	0.13	0.15	0.16	0.21	0.23	0.28	0.35	0.38	0.43	0.45	0.44	0.42	0.40	0.40
16	0.18	0.18	0.17	0.15	0.18	0.20	0.26	0.27	0.31	0.36	0.39	0.45	0.47	0.47	0.45	0.44	0.43	0.43
17	0.20	0.18	0.18	0.20	0.25	0.32	0.34	0.39	0.45	0.47	0.52	0.56	0.56	0.56	0.54	0.53	0.51	0.50
18	0.15	0.18	0.20	0.23	0.30	0.33	0.38	0.42	0.43	0.48	0.51	0.52	0.52	0.53	0.52	0.50	0.48	0.48
19	0.09	0.12	0.18	0.25	0.31	0.37	0.42	0.44	0.48	0.49	0.50	0.50	0.51	0.51	0.49	0.47	0.46	0.48
20	0.29	0.34	0.41	0.45	0.51	0.57	0.59	0.63	0.63	0.62	0.62	0.63	0.63	0.63	0.61	0.59	0.60	0.61
21	0.31	0.38	0.43	0.49	0.56	0.58	0.61	0.61	0.60	0.60	0.58	0.58	0.58	0.58	0.56	0.58	0.58	0.60
22	0.33	0.37	0.43	0.49	0.50	0.56	0.57	0.56	0.55	0.53	0.52	0.53	0.53	0.53	0.55	0.55	0.56	0.59
23	0.37	0.44	0.51	0.51	0.57	0.58	0.56	0.54	0.51	0.50	0.50	0.50	0.50	0.54	0.53	0.56	0.58	0.59
24	0.30	0.37	0.37	0.41	0.43	0.43	0.42	0.41	0.38	0.38	0.38	0.39	0.42	0.43	0.45	0.49	0.51	0.53
25	0.35	0.37	0.42	0.44	0.45	0.44	0.41	0.39	0.38	0.37	0.37	0.42	0.41	0.44	0.47	0.49	0.51	0.53
26	0.34	0.41	0.43	0.43	0.43	0.42	0.39	0.37	0.36	0.36	0.41	0.41	0.41	0.44	0.47	0.50	0.52	0.54
27	0.47	0.48	0.46	0.46	0.45	0.43	0.42	0.41	0.39	0.39	0.39	0.39	0.42	0.44	0.45	0.47	0.50	0.50
28	0.50	0.49	0.49	0.48	0.48	0.47	0.45	0.43	0.45	0.45	0.45	0.45	0.47	0.49	0.49	0.51	0.50	0.51
29	0.63	0.62	0.61	0.59	0.59	0.58	0.57	0.57	0.56	0.55	0.54	0.55	0.55	0.54	0.53	0.52	0.52	0.53
30	0.67	0.65	0.65	0.64	0.64	0.62	0.65	0.62	0.60	0.59	0.59	0.59	0.57	0.58	0.56	0.56	0.57	0.57
31	0.67	0.69	0.68	0.67	0.68	-0.10	-0.11	0.67	0.67	0.67	0.66	0.64	0.65	0.64	0.63	0.63	0.61	0.59
32	-0.08	-0.08	-0.10	-0.09	-0.06	-0.07	-0.09	-0.08	-0.09	-0.10	-0.12	-0.12	-0.13	-0.14	-0.14	-0.15	-0.18	0.63
33	0.02	0.00	0.00	0.04	0.04	0.03	0.01	-0.03	-0.05	-0.09	-0.09	-0.09	-0.09	-0.09	-0.11	-0.12	-0.14	-0.18
34	0.00	-0.01	0.00	0.00	0.01	0.02	0.00	-0.04	-0.07	-0.08	-0.10	-0.10	-0.09	-0.09	-0.11	-0.12	-0.16	-0.18
35	0.00	0.03	0.03	0.03	0.03	0.03	0.02	-0.03	-0.05	-0.08	-0.10	-0.08	-0.09	-0.09	-0.09	-0.12	-0.15	-0.17
36	0.02	0.02	0.00	0.01	0.01	0.00	-0.04	-0.08	-0.11	-0.12	-0.11	-0.11	-0.12	-0.11	-0.14	-0.16	-0.18	-0.20

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 35: Fama & French Alphas Regressions with IBOV market proxy - Small Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.02	0.93	0.56	-0.04	0.05	0.12	-0.17	-0.05	-0.23	-0.28	-0.22	-0.29	0.42	0.41	0.35	0.36	0.29	0.33
2	1.13	1.49	0.73	0.50	0.48	0.09	-0.08	-0.21	0.46	0.50	-0.24	0.41	0.37	0.24	0.19	0.23	0.18	0.23
3	1.83	0.94	0.85	0.30	0.25	0.01	0.35	0.30	0.46	0.32	0.28	0.15	-0.07	-0.05	-0.09	-0.01	0.10	0.06
4	0.33	0.05	0.47	0.13	0.12	-0.23	-0.37	-0.25	-0.26	-0.35	-0.40	-0.54	-0.67	-0.73	-0.66	-0.57	-0.51	-0.50
5	1.28	0.60	0.00	-0.13	0.51	0.32	0.31	0.35	0.24	0.14	0.03	-0.14	-0.34	-0.43	-0.30	-0.25	-0.21	-0.18
6	0.70	0.21	-0.17	-0.50	-0.51	-0.32	-0.38	-0.32	-0.38	-0.47	-0.52	-0.62	-0.76	-0.75	-0.67	-0.59	-0.53	-0.50
7	0.04	0.56	0.11	-0.19	0.07	-0.13	-0.35	-0.29	-0.36	-0.44	-0.53	-0.54	-0.62	-0.54	-0.44	-0.38	-0.31	-0.32
8	0.05	0.16	-0.38	-0.15	-0.34	-0.49	-0.56	-0.56	-0.56	-0.63	-0.57	-0.58	-0.46	-0.45	-0.36	-0.32	-0.28	-0.21
9	-0.05	-0.18	-0.20	-0.50	-0.66	-0.65	-0.58	-0.55	-0.68	-0.71	-0.64	-0.60	-0.59	-0.49	-0.40	-0.37	-0.36	-0.34
10	0.48	0.58	0.27	-0.16	-0.37	-0.48	-0.45	-0.48	-0.51	-0.51	-0.31	-0.37	-0.29	-0.19	-0.17	-0.15	-0.15	-0.16
11	-0.18	0.27	0.18	-0.11	-0.30	-0.35	-0.34	-0.30	-0.29	-0.15	-0.11	-0.15	-0.03	-0.01	0.05	0.08	0.06	0.04
12	0.38	0.24	-0.18	-0.46	-0.69	-0.67	-0.51	-0.46	-0.41	-0.39	-0.33	-0.28	-0.22	-0.19	-0.14	-0.13	-0.12	-0.16
13	0.49	-0.20	-0.47	-0.66	-0.67	-0.61	-0.48	-0.26	-0.31	-0.31	-0.28	-0.25	-0.19	-0.14	-0.14	-0.14	-0.18	-0.14
14	-0.12	-0.54	-0.62	-0.69	-0.62	-0.52	-0.43	-0.46	-0.43	-0.39	-0.21	-0.16	-0.10	-0.06	-0.03	-0.04	-0.02	-0.01
15	0.66	-0.11	-0.12	-0.34	-0.54	-0.53	-0.50	-0.52	-0.45	-0.42	-0.23	-0.19	-0.12	-0.07	-0.06	-0.01	0.04	0.05
16	0.26	-0.37	-0.34	-0.65	-0.66	-0.67	-0.65	-0.62	-0.58	-0.48	-0.33	-0.23	-0.13	-0.10	-0.02	0.03	0.07	0.13
17	0.01	-0.34	-0.66	-0.77	-0.79	-0.70	-0.64	-0.47	-0.43	-0.30	-0.18	-0.06	0.00	0.06	0.04	0.08	0.16	0.22
18	0.28	-0.61	-0.80	-0.77	-0.76	-0.73	-0.68	-0.62	-0.60	-0.41	-0.30	-0.16	-0.10	-0.07	-0.02	0.04	0.14	0.22
19	0.13	-0.58	-0.39	-0.46	-0.42	-0.51	-0.54	-0.50	-0.37	-0.25	-0.17	-0.05	-0.01	0.01	0.07	0.17	0.27	0.35
20	0.49	-0.29	-0.05	-0.11	-0.28	-0.41	-0.40	-0.22	-0.04	0.06	0.19	0.28	0.31	0.37	0.41	0.47	0.51	0.50
21	0.38	0.02	-0.09	-0.22	-0.28	-0.40	-0.43	-0.26	-0.34	-0.21	-0.09	-0.02	0.06	0.20	0.28	0.33	0.33	0.39
22	0.85	0.49	0.30	0.07	-0.10	-0.27	-0.39	-0.27	-0.12	-0.01	0.06	0.08	0.15	0.26	0.25	0.28	0.39	0.47
23	0.49	0.52	0.39	0.00	-0.19	-0.34	-0.47	-0.35	-0.41	-0.31	-0.15	-0.09	0.03	0.03	0.04	0.18	0.31	0.35
24	0.14	0.57	0.06	-0.44	-0.31	-0.44	-0.50	-0.44	-0.45	-0.35	-0.13	-0.10	-0.13	-0.12	-0.02	0.10	0.21	0.30
25	0.06	0.06	-0.42	-0.67	-0.90	-1.00	-1.03	-1.02	-0.91	-0.59	-0.35	-0.33	-0.32	-0.17	-0.05	0.06	0.15	0.17
26	0.11	-0.58	-0.90	-1.19	-1.24	-1.24	-1.25	-1.20	-1.01	-0.71	-0.61	-0.53	-0.34	-0.21	-0.08	0.03	0.11	0.13
27	0.04	-0.65	-1.08	-1.40	-1.38	-1.35	-1.30	-0.97	-0.79	-0.65	-0.52	-0.31	-0.13	0.00	0.13	0.26	0.32	0.35
28	-0.23	-0.90	-1.10	-1.42	-1.42	-1.36	-1.28	-0.92	-0.70	-0.59	-0.37	-0.14	0.02	0.17	0.33	0.39	0.44	0.47
29	-0.82	-0.92	-1.13	-1.19	-1.23	-1.21	-1.11	-1.03	-0.84	-0.57	-0.30	-0.09	0.10	0.25	0.31	0.35	0.40	0.40
30	0.20	-0.65	-0.88	-1.01	-0.97	-0.96	-0.94	-0.77	-0.44	-0.12	0.04	0.22	0.38	0.44	0.52	0.59	0.57	0.55
31	-0.33	-1.01	-1.11	-1.05	-0.93	-1.11	-1.06	-0.66	-0.48	-0.27	0.00	0.22	0.33	0.42	0.47	0.49	0.47	0.41
32	-1.13	-1.12	-1.04	-1.09	-1.19	-1.22	-0.70	-0.29	-0.04	0.24	0.45	0.64	0.68	0.74	-0.08	-0.09	0.67	0.64
33	-0.89	-0.49	-0.61	-0.93	-0.96	-0.58	-0.36	-0.14	0.16	0.40	0.59	0.71	-0.05	-0.01	-0.02	0.00	0.01	0.02
34	-0.28	-0.75	-1.34	-1.47	-0.81	-0.65	-0.40	-0.07	0.25	0.42	0.64	-0.04	-0.02	-0.03	-0.06	-0.07	-0.05	0.00
35	-0.58	-1.34	-1.70	-1.24	-0.93	-0.64	-0.26	0.05	0.29	0.51	0.64	0.71	0.71	0.66	0.64	0.67	-0.11	-0.11
36	-1.44	-1.83	-1.54	-1.30	-0.73	-0.29	0.05	0.30	0.55	0.65	-0.06	-0.02	-0.08	-0.10	-0.10	-0.08	-0.12	-0.13

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 36: Fama & French Alphas Regressions with IBOV market proxy - Small Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.34	0.39	0.32	0.39	0.37	0.37	0.42	0.39	0.43	0.43	0.33	0.34	0.39	0.42	0.35	0.35	0.32	0.26
2	0.23	0.21	0.21	0.24	0.25	0.30	0.26	0.26	0.29	0.27	0.28	0.34	0.37	0.33	0.33	0.32	0.23	0.19
3	0.04	0.07	0.09	0.11	0.12	0.16	0.10	0.14	0.13	0.15	0.13	0.15	0.11	0.14	0.12	0.03	-0.02	0.02
4	-0.50	-0.48	-0.47	-0.43	-0.43	-0.38	-0.38	-0.41	-0.41	-0.39	-0.41	-0.40	-0.35	-0.34	-0.42	-0.47	-0.42	-0.40
5	-0.15	-0.17	-0.17	-0.19	-0.21	-0.15	-0.18	-0.21	-0.18	-0.20	-0.23	-0.16	-0.13	-0.18	-0.23	-0.18	-0.16	-0.08
6	-0.48	-0.48	-0.48	-0.50	-0.51	-0.50	-0.51	-0.52	-0.47	-0.47	-0.45	-0.39	-0.44	-0.47	-0.44	-0.40	-0.31	-0.23
7	-0.30	-0.35	-0.38	-0.41	-0.42	-0.40	-0.41	-0.38	-0.33	-0.27	-0.23	-0.28	-0.31	-0.28	-0.24	-0.15	-0.05	0.02
8	-0.22	-0.23	-0.25	-0.28	-0.31	-0.31	-0.28	-0.26	-0.21	-0.17	-0.24	-0.26	-0.24	-0.21	-0.13	-0.02	0.04	0.10
9	-0.30	-0.29	-0.31	-0.35	-0.34	-0.28	-0.27	-0.25	-0.19	-0.27	-0.30	-0.26	-0.25	-0.16	-0.13	-0.06	0.02	0.10
10	-0.14	-0.17	-0.19	-0.20	-0.13	-0.10	-0.10	-0.07	-0.12	-0.16	-0.14	-0.09	-0.03	0.02	0.10	0.18	0.25	0.32
11	0.04	0.02	0.00	0.01	0.07	0.08	0.07	0.06	0.04	0.07	0.10	0.20	0.22	0.26	0.33	0.40	0.46	0.48
12	-0.13	-0.12	-0.06	-0.04	0.00	0.01	-0.05	-0.11	-0.07	-0.04	0.06	0.13	0.19	0.26	0.31	0.39	0.37	0.34
13	-0.10	-0.08	-0.03	0.00	0.05	0.07	0.02	0.03	0.07	0.11	0.16	0.28	0.36	0.36	0.44	0.44	0.41	0.39
14	0.02	0.06	0.12	0.13	0.17	0.12	0.15	0.20	0.27	0.28	0.30	0.39	0.43	0.51	0.52	0.49	0.43	0.39
15	0.07	0.14	0.18	0.16	0.13	0.15	0.17	0.28	0.28	0.29	0.36	0.42	0.48	0.50	0.49	0.44	0.38	0.36
16	0.18	0.25	0.23	0.22	0.27	0.29	0.41	0.41	0.46	0.50	0.53	0.63	0.64	0.65	0.62	0.59	0.56	0.55
17	0.27	0.33	0.34	0.38	0.45	0.57	0.60	0.65	0.70	0.69	-0.05	0.00	0.00	0.00	-0.01	-0.06	-0.11	0.67
18	0.29	0.28	0.34	0.40	0.54	0.57	0.62	0.68	0.67	-0.08	-0.06	-0.04	-0.04	-0.04	-0.07	-0.11	0.66	0.65
19	0.36	0.41	0.47	0.60	0.68	-0.06	0.00	-0.03	0.00	-0.01	-0.01	-0.01	-0.02	-0.02	-0.04	-0.07	-0.11	-0.07
20	0.55	0.61	-0.08	-0.02	0.07	0.14	0.11	0.15	0.13	0.08	0.08	0.09	0.08	0.07	0.05	0.03	0.04	0.03
21	0.43	0.55	0.63	0.71	-0.02	-0.04	0.00	-0.02	-0.05	-0.07	-0.08	-0.08	-0.09	-0.08	-0.09	-0.06	-0.08	-0.05
22	0.58	0.65	-0.06	0.01	0.00	0.04	0.03	-0.02	-0.05	-0.08	-0.10	-0.09	-0.09	-0.09	-0.04	-0.05	-0.02	0.05
23	0.42	0.51	0.63	0.67	-0.07	-0.09	0.66	0.62	0.57	0.54	0.54	0.56	0.56	0.63	0.64	0.68	-0.09	-0.06
24	0.31	0.42	0.44	0.52	0.55	0.49	0.44	0.39	0.33	0.33	0.35	0.36	0.43	0.46	0.48	0.55	0.57	0.62
25	0.26	0.29	0.33	0.33	0.31	0.27	0.23	0.18	0.17	0.19	0.19	0.30	0.31	0.32	0.37	0.40	0.43	0.48
26	0.15	0.19	0.19	0.18	0.17	0.14	0.10	0.07	0.06	0.07	0.10	0.13	0.11	0.14	0.17	0.21	0.25	0.32
27	0.44	0.43	0.40	0.37	0.34	0.29	0.26	0.23	0.22	0.25	0.26	0.29	0.29	0.32	0.36	0.39	0.44	0.45
28	0.46	0.43	0.41	0.40	0.39	0.37	0.32	0.30	0.34	0.36	0.37	0.39	0.40	0.40	0.43	0.47	0.47	0.47
29	0.40	0.37	0.37	0.38	0.38	0.36	0.35	0.38	0.37	0.38	0.38	0.39	0.40	0.39	0.41	0.43	0.41	0.45
30	0.55	0.53	0.51	0.52	0.49	0.46	0.51	0.47	0.45	0.43	0.45	0.45	0.42	0.44	0.44	0.43	0.43	0.41
31	0.41	0.43	0.45	0.43	0.42	0.49	0.47	0.47	0.50	0.52	0.51	0.49	0.49	0.50	0.47	0.50	0.47	0.43
32	0.62	0.61	0.60	0.60	0.64	0.62	0.57	0.58	0.59	0.58	0.58	0.61	-0.20	-0.21	-0.18	-0.19	0.57	0.54
33	0.04	-0.01	-0.05	0.03	0.02	0.07	0.07	0.03	0.07	0.07	0.09	0.09	0.08	0.07	0.03	-0.01	-0.05	-0.08
34	-0.04	-0.06	-0.06	-0.04	-0.05	0.02	0.04	0.06	0.05	0.05	0.04	0.03	0.04	0.03	0.00	-0.02	-0.09	-0.11
35	-0.13	-0.11	-0.12	-0.10	-0.10	-0.07	-0.11	-0.14	-0.14	-0.15	-0.16	-0.16	-0.16	-0.16	-0.17	-0.20	-0.23	-0.26
36	-0.05	-0.03	-0.09	-0.06	-0.05	-0.07	-0.11	-0.16	-0.19	-0.18	-0.19	-0.19	-0.20	-0.20	-0.24	-0.24	0.54	0.50

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 37: Fama & French Alphas Regressions with MSCI market proxy - Small Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.04	0.91	0.56	-0.04	0.05	0.11	-0.18	-0.06	-0.24	-0.29	-0.23	-0.30	0.41	0.40	0.34	0.36	0.29	0.33
2	1.11	1.48	0.73	0.49	0.47	0.08	-0.09	-0.21	0.46	0.49	-0.25	0.40	0.37	0.23	0.19	0.22	0.18	0.22
3	1.82	0.94	0.85	0.30	0.24	0.00	0.35	0.29	0.46	0.31	0.27	0.14	-0.07	-0.06	-0.10	-0.02	0.09	0.05
4	0.33	0.04	0.47	0.12	0.12	-0.23	-0.38	-0.26	-0.27	-0.36	-0.41	-0.55	-0.68	-0.73	-0.67	-0.57	-0.52	-0.51
5	1.26	0.59	-0.01	-0.14	0.50	0.31	0.30	0.35	0.23	0.13	0.02	-0.15	-0.35	-0.44	-0.31	-0.26	-0.23	-0.19
6	0.69	0.20	-0.18	-0.51	-0.52	-0.33	-0.38	-0.33	-0.38	-0.47	-0.53	-0.63	-0.77	-0.76	-0.69	-0.60	-0.55	-0.51
7	0.02	0.54	0.10	-0.20	0.06	-0.14	-0.36	-0.31	-0.37	-0.45	-0.54	-0.55	-0.63	-0.56	-0.46	-0.39	-0.32	-0.33
8	0.04	0.16	-0.39	-0.16	-0.35	-0.50	-0.57	-0.57	-0.57	-0.64	-0.58	-0.59	-0.48	-0.46	-0.37	-0.34	-0.29	-0.22
9	-0.06	-0.19	-0.21	-0.51	-0.67	-0.66	-0.59	-0.56	-0.70	-0.72	-0.65	-0.62	-0.61	-0.51	-0.41	-0.39	-0.37	-0.36
10	0.47	0.57	0.26	-0.17	-0.38	-0.49	-0.46	-0.49	-0.53	-0.53	-0.33	-0.39	-0.31	-0.21	-0.19	-0.16	-0.16	-0.17
11	-0.19	0.25	0.17	-0.12	-0.31	-0.37	-0.35	-0.31	-0.31	-0.17	-0.13	-0.16	-0.05	-0.02	0.03	0.07	0.05	0.02
12	0.37	0.23	-0.19	-0.47	-0.70	-0.69	-0.53	-0.48	-0.43	-0.41	-0.35	-0.29	-0.24	-0.20	-0.16	-0.15	-0.13	-0.17
13	0.48	-0.21	-0.49	-0.67	-0.69	-0.62	-0.50	-0.28	-0.33	-0.33	-0.30	-0.27	-0.20	-0.16	-0.16	-0.16	-0.20	-0.15
14	-0.13	-0.55	-0.64	-0.70	-0.64	-0.54	-0.45	-0.48	-0.45	-0.41	-0.23	-0.18	-0.12	-0.08	-0.04	-0.05	-0.03	-0.02
15	0.64	-0.13	-0.14	-0.36	-0.56	-0.55	-0.53	-0.54	-0.47	-0.44	-0.25	-0.21	-0.14	-0.08	-0.07	-0.03	0.02	0.03
16	0.24	-0.39	-0.36	-0.67	-0.68	-0.69	-0.67	-0.64	-0.60	-0.50	-0.35	-0.25	-0.15	-0.12	-0.03	0.02	0.05	0.12
17	-0.01	-0.36	-0.68	-0.79	-0.82	-0.72	-0.66	-0.49	-0.45	-0.32	-0.20	-0.08	-0.02	0.05	0.03	0.07	0.15	0.21
18	0.26	-0.63	-0.83	-0.79	-0.78	-0.75	-0.70	-0.63	-0.61	-0.43	-0.32	-0.17	-0.12	-0.09	-0.03	0.02	0.13	0.21
19	0.11	-0.60	-0.41	-0.48	-0.44	-0.53	-0.56	-0.51	-0.39	-0.26	-0.18	-0.07	-0.02	-0.01	0.05	0.16	0.25	0.34
20	0.47	-0.31	-0.08	-0.13	-0.30	-0.42	-0.41	-0.23	-0.05	0.04	0.17	0.26	0.30	0.36	0.40	0.46	0.50	0.49
21	0.36	0.00	-0.10	-0.23	-0.29	-0.41	-0.44	-0.27	-0.35	-0.23	-0.11	-0.03	0.05	0.19	0.27	0.32	0.32	0.38
22	0.83	0.47	0.28	0.06	-0.11	-0.28	-0.40	-0.28	-0.13	-0.02	0.05	0.07	0.13	0.25	0.24	0.27	0.38	0.46
23	0.47	0.51	0.38	-0.01	-0.20	-0.35	-0.48	-0.36	-0.41	-0.32	-0.16	-0.10	0.02	0.02	0.03	0.17	0.30	0.34
24	0.14	0.57	0.05	-0.45	-0.32	-0.45	-0.51	-0.44	-0.45	-0.36	-0.13	-0.11	-0.14	-0.12	-0.03	0.09	0.20	0.29
25	0.06	0.05	-0.43	-0.68	-0.91	-1.01	-1.04	-1.02	-0.91	-0.60	-0.35	-0.33	-0.33	-0.18	-0.06	0.05	0.14	0.16
26	0.10	-0.59	-0.91	-1.20	-1.24	-1.25	-1.26	-1.20	-1.01	-0.72	-0.62	-0.54	-0.35	-0.22	-0.09	0.02	0.10	0.12
27	0.04	-0.66	-1.08	-1.40	-1.39	-1.35	-1.31	-0.97	-0.80	-0.65	-0.53	-0.32	-0.13	-0.01	0.12	0.25	0.31	0.34
28	-0.23	-0.91	-1.10	-1.42	-1.43	-1.36	-1.29	-0.92	-0.71	-0.59	-0.38	-0.15	0.01	0.16	0.32	0.38	0.43	0.46
29	-0.83	-0.93	-1.13	-1.19	-1.24	-1.21	-1.11	-1.03	-0.85	-0.57	-0.30	-0.10	0.09	0.24	0.30	0.34	0.39	0.39
30	0.20	-0.65	-0.88	-1.01	-0.97	-0.97	-0.94	-0.78	-0.44	-0.13	0.03	0.21	0.37	0.43	0.51	0.58	0.56	0.54
31	-0.33	-1.01	-1.11	-1.05	-0.94	-1.11	-1.07	-0.66	-0.48	-0.27	-0.01	0.21	0.32	0.41	0.46	0.48	0.46	0.40
32	-1.13	-1.13	-1.04	-1.10	-1.20	-1.23	-0.71	-0.30	-0.05	0.22	0.44	0.63	0.66	0.73	-0.09	-0.10	0.66	0.63
33	-0.90	-0.49	-0.62	-0.95	-0.97	-0.59	-0.37	-0.15	0.15	0.39	0.58	0.69	-0.07	-0.03	-0.04	-0.01	-0.01	0.01
34	-0.27	-0.75	-1.35	-1.48	-0.83	-0.66	-0.41	-0.09	0.24	0.41	0.62	-0.06	-0.04	-0.05	-0.07	-0.09	-0.07	-0.01
35	-0.60	-1.35	-1.71	-1.26	-0.95	-0.66	-0.28	0.04	0.27	0.49	0.62	0.69	0.69	0.64	0.62	0.65	-0.13	-0.13
36	-1.46	-1.84	-1.55	-1.31	-0.74	-0.30	0.04	0.28	0.53	0.63	-0.07	-0.04	-0.10	-0.12	-0.12	-0.10	-0.14	-0.14

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 38: Fama & French Alphas Regressions with MSCI market proxy - Small Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	0.33	0.39	0.31	0.39	0.36	0.37	0.41	0.39	0.43	0.42	0.33	0.34	0.38	0.42	0.35	0.35	0.32	0.26
2	0.22	0.20	0.20	0.23	0.24	0.29	0.25	0.25	0.29	0.26	0.28	0.34	0.37	0.33	0.33	0.32	0.23	0.19
3	0.03	0.06	0.08	0.10	0.11	0.15	0.10	0.13	0.13	0.15	0.12	0.14	0.11	0.14	0.11	0.03	-0.02	0.01
4	-0.50	-0.49	-0.47	-0.44	-0.44	-0.38	-0.38	-0.41	-0.41	-0.39	-0.41	-0.40	-0.35	-0.34	-0.42	-0.47	-0.42	-0.40
5	-0.16	-0.18	-0.18	-0.20	-0.21	-0.16	-0.19	-0.22	-0.19	-0.20	-0.24	-0.16	-0.13	-0.18	-0.23	-0.18	-0.17	-0.09
6	-0.49	-0.49	-0.48	-0.50	-0.52	-0.51	-0.52	-0.53	-0.48	-0.48	-0.45	-0.39	-0.45	-0.47	-0.44	-0.41	-0.32	-0.23
7	-0.31	-0.36	-0.39	-0.42	-0.42	-0.41	-0.41	-0.39	-0.34	-0.28	-0.24	-0.28	-0.31	-0.29	-0.25	-0.16	-0.06	0.01
8	-0.23	-0.24	-0.26	-0.29	-0.32	-0.32	-0.29	-0.27	-0.22	-0.17	-0.24	-0.26	-0.25	-0.22	-0.13	-0.02	0.03	0.10
9	-0.31	-0.30	-0.32	-0.36	-0.34	-0.29	-0.27	-0.25	-0.20	-0.27	-0.31	-0.27	-0.25	-0.17	-0.13	-0.06	0.01	0.09
10	-0.16	-0.18	-0.20	-0.21	-0.14	-0.11	-0.11	-0.08	-0.13	-0.17	-0.14	-0.10	-0.04	0.02	0.09	0.17	0.25	0.31
11	0.03	0.01	-0.02	0.00	0.06	0.07	0.07	0.05	0.03	0.06	0.10	0.19	0.22	0.25	0.32	0.39	0.46	0.48
12	-0.14	-0.13	-0.07	-0.05	0.00	0.00	-0.06	-0.12	-0.08	-0.05	0.05	0.12	0.18	0.25	0.30	0.39	0.37	0.33
13	-0.12	-0.09	-0.04	-0.01	0.04	0.06	0.01	0.02	0.06	0.10	0.15	0.28	0.35	0.36	0.43	0.44	0.40	0.38
14	0.01	0.05	0.11	0.12	0.16	0.11	0.14	0.19	0.26	0.28	0.29	0.39	0.42	0.50	0.51	0.48	0.43	0.39
15	0.06	0.13	0.17	0.15	0.12	0.15	0.16	0.27	0.28	0.28	0.36	0.41	0.47	0.50	0.48	0.44	0.38	0.35
16	0.17	0.24	0.23	0.21	0.26	0.29	0.40	0.40	0.45	0.49	0.52	0.62	0.63	0.64	0.62	0.58	0.55	0.55
17	0.26	0.32	0.33	0.37	0.44	0.56	0.59	0.64	0.69	0.68	-0.06	-0.01	0.00	-0.01	-0.02	-0.07	-0.12	0.66
18	0.28	0.27	0.34	0.39	0.53	0.56	0.61	0.67	0.66	-0.09	-0.07	-0.04	-0.05	-0.04	-0.08	-0.12	0.65	0.65
19	0.35	0.40	0.46	0.59	0.67	-0.07	-0.01	-0.04	0.00	-0.02	-0.02	-0.01	-0.02	-0.02	-0.04	-0.08	-0.12	-0.07
20	0.55	0.61	-0.09	-0.03	0.06	0.13	0.10	0.14	0.12	0.08	0.08	0.09	0.07	0.07	0.05	0.02	0.04	0.03
21	0.42	0.54	0.62	0.70	-0.03	-0.05	-0.01	-0.03	-0.06	-0.08	-0.09	-0.09	-0.10	-0.09	-0.09	-0.06	-0.09	-0.05
22	0.57	0.64	-0.07	0.00	-0.01	0.04	0.02	-0.02	-0.05	-0.08	-0.10	-0.10	-0.09	-0.09	-0.05	-0.05	-0.02	0.05
23	0.41	0.51	0.63	0.66	-0.08	-0.09	0.65	0.61	0.57	0.54	0.53	0.56	0.56	0.63	0.64	0.67	-0.10	-0.06
24	0.31	0.42	0.43	0.52	0.54	0.48	0.43	0.38	0.33	0.33	0.34	0.36	0.43	0.46	0.47	0.54	0.56	0.61
25	0.25	0.29	0.32	0.32	0.31	0.26	0.22	0.17	0.16	0.18	0.19	0.29	0.30	0.31	0.36	0.39	0.42	0.48
26	0.15	0.18	0.18	0.17	0.16	0.14	0.09	0.07	0.06	0.07	0.09	0.12	0.11	0.14	0.16	0.21	0.24	0.32
27	0.43	0.42	0.40	0.37	0.34	0.28	0.25	0.23	0.21	0.24	0.26	0.28	0.29	0.31	0.35	0.39	0.43	0.44
28	0.45	0.42	0.40	0.39	0.38	0.36	0.31	0.29	0.33	0.35	0.37	0.38	0.40	0.39	0.42	0.46	0.46	0.47
29	0.39	0.36	0.36	0.38	0.37	0.36	0.34	0.37	0.38	0.36	0.37	0.39	0.39	0.39	0.41	0.42	0.40	0.44
30	0.54	0.52	0.50	0.51	0.48	0.46	0.50	0.47	0.44	0.42	0.45	0.44	0.42	0.43	0.43	0.42	0.43	0.40
31	0.40	0.42	0.44	0.42	0.41	0.48	0.47	0.46	0.49	0.51	0.51	0.48	0.49	0.49	0.46	0.49	0.46	0.43
32	0.61	0.60	0.59	0.59	0.63	0.61	0.57	0.57	0.58	0.57	0.57	0.60	-0.21	-0.21	-0.19	-0.20	0.56	0.54
33	0.03	-0.02	-0.06	0.02	0.01	0.06	0.06	0.02	0.06	0.06	0.08	0.08	0.07	0.07	0.02	-0.02	-0.05	-0.08
34	-0.05	-0.07	-0.07	-0.05	-0.06	0.01	0.02	0.05	0.04	0.04	0.03	0.02	0.03	0.02	-0.01	-0.03	-0.10	-0.11
35	-0.15	-0.13	-0.13	-0.12	-0.11	-0.08	-0.12	-0.15	-0.15	-0.16	-0.17	-0.17	-0.17	-0.17	-0.17	-0.21	-0.23	-0.27
36	-0.06	-0.05	-0.10	-0.07	-0.06	-0.08	-0.12	-0.17	-0.20	-0.19	-0.19	-0.20	-0.21	-0.21	-0.24	-0.24	0.53	0.49

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 39: Fama & French Alphas Regressions with IBOV market proxy - Big Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.70	0.15	0.22	0.19	-0.29	-0.24	-0.31	-0.25	-0.31	-0.21	-0.08	-0.16	-0.20	-0.19	-0.24	-0.21	-0.25	-0.19
2	-0.22	0.01	-0.14	-0.08	-0.01	-0.04	-0.10	-0.15	-0.11	-0.03	-0.01	-0.01	-0.07	-0.12	-0.13	-0.18	-0.21	-0.20
3	-0.23	-0.27	-0.12	-0.05	0.13	0.06	-0.04	-0.03	0.01	0.01	0.00	-0.04	-0.11	-0.17	-0.21	-0.22	-0.23	-0.24
4	0.09	-0.40	-0.15	-0.08	0.13	0.07	0.02	0.03	-0.02	0.02	0.03	-0.06	-0.11	-0.18	-0.18	-0.19	-0.23	-0.19
5	-0.19	0.12	0.20	0.16	0.20	0.16	0.13	0.12	0.11	0.14	0.12	0.04	-0.05	-0.09	-0.12	-0.16	-0.17	-0.15
6	0.18	0.27	0.30	0.10	0.17	0.19	0.13	0.11	0.06	0.06	0.06	-0.05	-0.07	-0.08	-0.13	-0.13	-0.14	-0.09
7	0.39	0.31	0.25	0.20	0.31	0.21	0.18	0.12	0.10	0.08	0.04	0.00	-0.05	-0.09	-0.12	-0.11	-0.11	-0.09
8	0.28	-0.01	0.07	0.08	0.15	0.10	0.01	-0.04	-0.07	-0.08	0.00	-0.05	0.66	0.64	0.61	0.65	-0.17	-0.14
9	-0.20	0.54	-0.15	-0.06	-0.01	-0.08	-0.16	0.62	0.62	0.66	0.67	0.58	0.54	0.52	0.53	0.56	0.60	0.64
10	-0.30	-0.13	-0.08	-0.09	-0.03	0.62	0.50	0.44	0.55	0.56	0.52	0.46	0.44	0.48	0.49	0.54	0.55	0.57
11	-0.20	-0.18	-0.17	0.60	0.58	0.51	0.46	0.56	0.62	0.58	0.56	0.54	0.55	0.57	0.59	0.63	0.64	0.64
12	0.50	0.47	0.52	0.43	0.44	0.34	0.36	0.44	0.45	0.45	0.43	0.44	0.44	0.47	0.48	0.51	0.55	0.53
13	0.33	0.42	0.50	0.44	0.46	0.51	0.50	0.49	0.46	0.46	0.46	0.46	0.48	0.50	0.54	0.58	0.60	0.57
14	0.50	0.34	0.38	0.33	0.50	0.51	0.42	0.36	0.34	0.36	0.37	0.38	0.39	0.40	0.43	0.46	0.46	0.43
15	0.35	0.28	0.25	0.44	0.51	0.48	0.38	0.40	0.44	0.45	0.46	0.46	0.48	0.50	0.50	0.50	0.47	0.46
16	-0.07	-0.01	0.22	0.35	0.42	0.39	0.32	0.39	0.39	0.39	0.43	0.44	0.44	0.45	0.45	0.44	0.44	0.40
17	-0.20	0.11	0.33	0.30	0.34	0.27	0.30	0.32	0.35	0.39	0.42	0.43	0.43	0.44	0.41	0.38	0.35	0.34
18	-0.19	0.10	0.20	0.16	0.17	0.15	0.17	0.25	0.30	0.34	0.37	0.37	0.38	0.36	0.33	0.29	0.27	0.26
19	-0.07	0.06	0.16	0.09	0.15	0.17	0.20	0.29	0.31	0.35	0.38	0.38	0.38	0.37	0.35	0.31	0.30	0.29
20	-0.21	-0.03	-0.06	-0.01	0.02	0.07	0.13	0.20	0.26	0.29	0.33	0.31	0.31	0.31	0.30	0.27	0.27	0.27
21	-0.09	0.01	0.09	0.13	0.20	0.18	0.24	0.26	0.30	0.29	0.31	0.32	0.31	0.30	0.29	0.27	0.29	0.29
22	-0.08	0.00	0.06	0.04	0.12	0.12	0.13	0.15	0.17	0.18	0.24	0.24	0.23	0.21	0.19	0.19	0.20	0.20
23	0.04	0.17	0.12	0.08	0.18	0.14	0.10	0.12	0.16	0.19	0.20	0.22	0.21	0.19	0.19	0.19	0.17	0.17
24	0.43	0.42	0.29	0.21	0.23	0.14	0.11	0.09	0.14	0.15	0.18	0.17	0.17	0.17	0.17	0.16	0.14	0.14
25	0.24	0.10	0.09	0.05	0.11	0.05	0.06	0.06	0.10	0.12	0.11	0.12	0.16	0.18	0.17	0.15	0.14	0.14
26	-0.14	0.05	0.01	-0.03	0.01	0.02	0.04	0.05	0.07	0.07	0.08	0.09	0.14	0.14	0.12	0.10	0.10	0.13
27	0.08	0.02	-0.04	-0.14	-0.05	-0.04	-0.03	0.00	-0.01	0.00	0.02	0.04	0.08	0.08	0.08	0.11	0.13	0.13
28	-0.32	-0.12	-0.23	-0.24	-0.14	-0.11	-0.09	-0.06	-0.04	0.03	0.08	0.10	0.13	0.13	0.15	0.17	0.15	0.17
29	0.03	-0.13	-0.21	-0.16	-0.13	-0.13	-0.11	-0.12	-0.04	0.01	0.04	0.06	0.09	0.12	0.14	0.14	0.15	0.15
30	-0.31	-0.20	-0.13	-0.17	-0.14	-0.14	-0.12	-0.07	0.01	0.04	0.07	0.09	0.15	0.17	0.19	0.18	0.19	0.21
31	-0.19	-0.23	-0.20	-0.27	-0.25	-0.26	-0.14	-0.06	0.00	0.03	0.06	0.12	0.17	0.18	0.20	0.21	0.23	0.26
32	-0.52	-0.38	-0.27	-0.22	-0.18	-0.07	-0.03	0.00	0.06	0.08	0.15	0.21	0.25	0.28	0.30	0.31	0.35	0.37
33	-0.33	-0.26	-0.16	-0.15	-0.04	-0.02	0.00	0.03	0.05	0.12	0.21	0.25	0.28	0.29	0.32	0.36	0.38	0.41
34	0.25	0.09	0.09	0.11	0.17	0.15	0.15	0.16	0.23	0.29	0.35	0.37	0.41	0.44	0.47	0.49	0.50	0.49
35	-0.14	0.01	0.12	0.17	0.16	0.15	0.10	0.17	0.30	0.33	0.39	0.42	0.46	0.51	0.54	0.57	0.57	0.56
36	0.03	0.20	0.13	0.16	0.18	0.16	0.18	0.29	0.40	0.44	0.49	0.52	0.58	0.59	0.63	0.62	0.62	0.62

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 40: Fama & French Alphas Regressions with IBOV market proxy - Big Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	-0.20	-0.24	-0.25	-0.23	-0.22	-0.21	-0.19	-0.22	-0.23	-0.27	-0.30	-0.35	-0.34	-0.34	0.46	0.46	0.45	-0.35
2	-0.23	-0.27	-0.27	-0.25	-0.22	-0.19	-0.20	-0.24	-0.28	0.49	0.47	0.44	0.43	0.41	0.44	0.43	0.45	0.46
3	-0.27	-0.28	-0.26	-0.24	-0.20	-0.18	-0.19	-0.24	0.52	0.46	0.44	0.42	0.40	0.42	0.42	0.43	0.44	0.46
4	-0.22	-0.23	-0.21	-0.16	-0.13	-0.14	-0.18	-0.27	0.49	0.45	0.42	0.38	0.37	0.38	0.38	0.40	0.42	0.43
5	-0.13	-0.16	-0.12	-0.08	-0.05	-0.07	-0.14	-0.22	0.53	0.48	0.44	0.40	0.39	0.41	0.41	0.42	0.43	0.43
6	-0.12	-0.13	-0.11	-0.10	-0.12	-0.16	-0.21	0.53	0.48	0.42	0.40	0.38	0.37	0.40	0.39	0.38	0.37	0.38
7	-0.10	-0.12	-0.13	-0.14	-0.18	0.58	0.52	0.45	0.38	0.36	0.35	0.32	0.33	0.32	0.31	0.31	0.30	0.31
8	-0.13	-0.15	-0.17	0.64	0.62	0.58	0.52	0.46	0.42	0.39	0.38	0.35	0.35	0.34	0.33	0.33	0.34	0.37
9	0.65	0.62	0.58	0.56	0.52	0.48	0.42	0.38	0.34	0.29	0.29	0.28	0.28	0.27	0.26	0.28	0.30	0.33
10	0.56	0.51	0.48	0.44	0.40	0.36	0.33	0.29	0.24	0.21	0.21	0.20	0.20	0.20	0.19	0.21	0.23	0.27
11	0.63	0.59	0.54	0.50	0.46	0.43	0.39	0.34	0.30	0.26	0.25	0.23	0.23	0.24	0.24	0.26	0.30	0.33
12	0.51	0.46	0.42	0.39	0.37	0.34	0.30	0.27	0.23	0.20	0.18	0.17	0.17	0.19	0.21	0.24	0.26	0.30
13	0.54	0.49	0.45	0.43	0.41	0.38	0.35	0.29	0.26	0.22	0.20	0.19	0.21	0.23	0.25	0.28	0.30	0.33
14	0.41	0.36	0.34	0.31	0.30	0.28	0.25	0.20	0.18	0.17	0.16	0.17	0.19	0.22	0.23	0.25	0.27	0.30
15	0.45	0.40	0.36	0.34	0.32	0.29	0.27	0.24	0.22	0.22	0.22	0.22	0.24	0.25	0.27	0.29	0.31	0.35
16	0.37	0.34	0.31	0.29	0.27	0.26	0.24	0.21	0.20	0.20	0.22	0.23	0.25	0.26	0.28	0.29	0.33	0.35
17	0.33	0.29	0.27	0.25	0.24	0.21	0.20	0.18	0.19	0.20	0.21	0.21	0.23	0.25	0.27	0.29	0.32	0.33
18	0.25	0.22	0.21	0.19	0.16	0.14	0.14	0.14	0.15	0.16	0.17	0.18	0.20	0.22	0.25	0.27	0.29	0.30
19	0.27	0.23	0.22	0.20	0.17	0.17	0.17	0.18	0.18	0.18	0.21	0.21	0.23	0.25	0.27	0.27	0.30	0.32
20	0.27	0.25	0.22	0.20	0.19	0.20	0.22	0.22	0.22	0.23	0.25	0.25	0.28	0.29	0.29	0.30	0.32	0.34
21	0.29	0.25	0.22	0.21	0.22	0.24	0.24	0.24	0.24	0.26	0.28	0.29	0.30	0.31	0.31	0.31	0.34	0.36
22	0.20	0.18	0.16	0.17	0.18	0.20	0.22	0.24	0.26	0.26	0.29	0.29	0.30	0.31	0.32	0.33	0.35	0.37
23	0.15	0.14	0.15	0.15	0.16	0.17	0.20	0.22	0.22	0.24	0.25	0.25	0.26	0.25	0.25	0.27	0.30	0.32
24	0.14	0.16	0.16	0.18	0.20	0.24	0.27	0.28	0.28	0.30	0.31	0.31	0.32	0.33	0.34	0.35	0.38	0.40
25	0.16	0.16	0.18	0.20	0.22	0.26	0.27	0.27	0.28	0.28	0.31	0.30	0.31	0.32	0.32	0.34	0.36	0.38
26	0.14	0.15	0.16	0.18	0.20	0.22	0.23	0.24	0.25	0.26	0.27	0.27	0.29	0.30	0.31	0.34	0.36	0.37
27	0.15	0.16	0.20	0.22	0.23	0.25	0.26	0.27	0.28	0.29	0.30	0.31	0.31	0.33	0.34	0.36	0.39	0.41
28	0.18	0.20	0.22	0.23	0.25	0.26	0.27	0.27	0.26	0.26	0.27	0.26	0.28	0.31	0.31	0.33	0.35	0.37
29	0.17	0.21	0.22	0.23	0.24	0.26	0.26	0.26	0.25	0.25	0.24	0.25	0.28	0.29	0.29	0.31	0.33	0.35
30	0.24	0.27	0.28	0.28	0.29	0.29	0.29	0.29	0.28	0.27	0.28	0.28	0.28	0.29	0.30	0.31	0.35	0.37
31	0.29	0.31	0.32	0.33	0.34	0.34	0.34	0.34	0.32	0.33	0.33	0.33	0.34	0.35	0.37	0.38	0.39	0.42
32	0.40	0.40	0.40	0.41	0.41	0.41	0.40	0.38	0.36	0.36	0.36	0.36	0.37	0.38	0.39	0.40	0.42	0.43
33	0.42	0.42	0.42	0.43	0.43	0.44	0.40	0.39	0.38	0.38	0.38	0.40	0.41	0.41	0.42	0.44	0.45	0.46
34	0.48	0.47	0.46	0.46	0.47	0.46	0.44	0.42	0.41	0.40	0.41	0.41	0.40	0.41	0.42	0.43	0.44	0.44
35	0.56	0.53	0.52	0.52	0.50	0.49	0.47	0.45	0.44	0.45	0.44	0.44	0.44	0.44	0.45	0.45	0.45	0.46
36	0.59	0.57	0.57	0.54	0.52	0.50	0.49	0.47	0.47	0.47	0.47	0.47	0.47	0.48	0.48	0.48	0.48	0.50

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 41: Fama & French Alphas Regressions with MSCI market proxy - Big Stocks - Part I

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	-0.72	0.13	0.21	0.18	-0.29	-0.25	-0.32	-0.26	-0.32	-0.22	-0.09	-0.17	-0.20	-0.19	-0.24	-0.22	-0.25	-0.19
2	-0.24	-0.01	-0.16	-0.09	-0.02	-0.05	-0.11	-0.17	-0.12	-0.04	-0.03	-0.02	-0.08	-0.12	-0.14	-0.18	-0.22	-0.20
3	-0.26	-0.29	-0.13	-0.06	0.12	0.05	-0.06	-0.05	0.00	0.00	-0.02	-0.05	-0.12	-0.18	-0.22	-0.23	-0.24	-0.24
4	0.07	-0.42	-0.17	-0.09	0.12	0.05	0.00	0.01	-0.03	0.00	0.02	-0.07	-0.12	-0.19	-0.19	-0.19	-0.24	-0.20
5	-0.21	0.10	0.19	0.15	0.18	0.14	0.11	0.10	0.09	0.13	0.10	0.03	-0.06	-0.10	-0.12	-0.16	-0.18	-0.16
6	0.15	0.25	0.28	0.08	0.16	0.17	0.11	0.09	0.05	0.04	0.04	-0.06	-0.08	-0.09	-0.14	-0.14	-0.15	-0.10
7	0.37	0.29	0.23	0.17	0.29	0.19	0.16	0.10	0.08	0.07	0.02	-0.01	-0.06	-0.10	-0.12	-0.12	-0.12	-0.10
8	0.25	-0.04	0.04	0.06	0.13	0.08	-0.02	-0.06	-0.08	-0.09	-0.02	-0.07	0.65	0.63	0.60	0.64	-0.18	-0.15
9	-0.23	0.51	-0.18	-0.08	-0.03	-0.10	-0.19	0.60	0.60	0.64	0.65	0.57	0.53	0.51	0.52	0.55	0.59	0.63
10	-0.34	-0.16	-0.11	-0.11	-0.06	0.60	0.48	0.42	0.54	0.55	0.50	0.45	0.43	0.47	0.48	0.54	0.54	0.56
11	-0.23	-0.21	-0.19	0.58	0.56	0.49	0.44	0.54	0.61	0.57	0.55	0.53	0.55	0.56	0.58	0.63	0.64	0.64
12	0.47	0.45	0.50	0.41	0.42	0.32	0.35	0.42	0.43	0.43	0.42	0.43	0.44	0.47	0.47	0.51	0.54	0.53
13	0.31	0.40	0.48	0.43	0.45	0.50	0.48	0.48	0.45	0.45	0.45	0.46	0.47	0.50	0.53	0.58	0.60	0.56
14	0.48	0.32	0.36	0.31	0.48	0.50	0.40	0.34	0.33	0.35	0.37	0.37	0.38	0.40	0.42	0.46	0.45	0.43
15	0.33	0.26	0.23	0.42	0.49	0.46	0.36	0.38	0.43	0.44	0.45	0.45	0.47	0.49	0.50	0.50	0.47	0.46
16	-0.09	-0.03	0.20	0.34	0.41	0.38	0.30	0.38	0.38	0.38	0.42	0.43	0.44	0.45	0.45	0.43	0.43	0.40
17	-0.22	0.09	0.31	0.28	0.33	0.26	0.28	0.31	0.34	0.39	0.42	0.42	0.43	0.43	0.41	0.38	0.35	0.34
18	-0.21	0.08	0.19	0.14	0.15	0.14	0.16	0.24	0.29	0.33	0.37	0.36	0.37	0.36	0.33	0.28	0.27	0.26
19	-0.09	0.04	0.15	0.08	0.14	0.15	0.19	0.28	0.30	0.34	0.37	0.38	0.38	0.36	0.34	0.31	0.29	0.29
20	-0.23	-0.04	-0.08	-0.02	0.01	0.06	0.12	0.18	0.25	0.28	0.32	0.30	0.30	0.30	0.29	0.27	0.27	0.27
21	-0.12	-0.01	0.08	0.12	0.19	0.17	0.22	0.25	0.29	0.28	0.30	0.31	0.30	0.29	0.29	0.26	0.28	0.28
22	-0.10	-0.02	0.04	0.03	0.11	0.11	0.12	0.14	0.16	0.17	0.24	0.23	0.23	0.20	0.18	0.19	0.19	0.19
23	0.03	0.15	0.11	0.07	0.17	0.13	0.09	0.11	0.15	0.18	0.19	0.21	0.20	0.18	0.19	0.19	0.17	0.17
24	0.42	0.41	0.28	0.20	0.22	0.13	0.11	0.08	0.13	0.15	0.17	0.16	0.16	0.16	0.17	0.15	0.14	0.13
25	0.22	0.08	0.07	0.04	0.10	0.04	0.05	0.05	0.09	0.11	0.10	0.11	0.16	0.17	0.17	0.15	0.14	0.14
26	-0.16	0.03	0.00	-0.04	0.00	0.01	0.03	0.04	0.06	0.07	0.07	0.08	0.14	0.14	0.11	0.09	0.10	0.13
27	0.06	0.01	-0.05	-0.15	-0.06	-0.05	-0.04	-0.01	-0.02	-0.01	0.01	0.04	0.08	0.08	0.08	0.10	0.12	0.12
28	-0.34	-0.14	-0.24	-0.25	-0.15	-0.11	-0.10	-0.07	-0.05	0.02	0.07	0.09	0.12	0.12	0.14	0.16	0.15	0.17
29	0.01	-0.14	-0.22	-0.17	-0.14	-0.14	-0.12	-0.13	-0.05	0.00	0.04	0.05	0.08	0.12	0.14	0.13	0.14	0.15
30	-0.33	-0.21	-0.14	-0.18	-0.15	-0.15	-0.13	-0.08	0.00	0.04	0.07	0.09	0.14	0.17	0.18	0.18	0.19	0.21
31	-0.20	-0.24	-0.21	-0.28	-0.26	-0.26	-0.14	-0.06	-0.01	0.03	0.06	0.12	0.16	0.18	0.20	0.20	0.22	0.25
32	-0.53	-0.39	-0.27	-0.22	-0.19	-0.08	-0.04	0.00	0.06	0.07	0.14	0.20	0.24	0.27	0.30	0.31	0.34	0.37
33	-0.35	-0.27	-0.17	-0.16	-0.05	-0.02	0.00	0.03	0.05	0.12	0.20	0.24	0.27	0.29	0.32	0.36	0.38	0.40
34	0.24	0.08	0.08	0.10	0.17	0.14	0.15	0.15	0.22	0.29	0.34	0.37	0.41	0.43	0.47	0.48	0.50	0.48
35	-0.15	0.00	0.11	0.16	0.15	0.14	0.09	0.17	0.29	0.32	0.39	0.41	0.46	0.50	0.54	0.56	0.56	0.56
36	0.01	0.19	0.13	0.15	0.17	0.15	0.17	0.28	0.39	0.43	0.48	0.52	0.57	0.59	0.63	0.61	0.62	0.61

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.

Table 42: Fama & French Alphas Regressions with MSCI market proxy - Big Stocks - Part II

	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	-0.20	-0.24	-0.25	-0.23	-0.23	-0.21	-0.20	-0.22	-0.24	-0.28	-0.30	-0.35	-0.34	-0.34	0.46	0.46	0.45	-0.35
2	-0.24	-0.27	-0.27	-0.25	-0.22	-0.20	-0.21	-0.24	-0.29	0.49	0.46	0.44	0.42	0.41	0.43	0.43	0.45	0.46
3	-0.28	-0.29	-0.26	-0.25	-0.21	-0.18	-0.19	-0.24	0.51	0.46	0.43	0.41	0.40	0.42	0.42	0.43	0.44	0.46
4	-0.23	-0.24	-0.22	-0.16	-0.14	-0.14	-0.19	-0.27	0.49	0.45	0.41	0.37	0.37	0.37	0.38	0.40	0.42	0.43
5	-0.14	-0.16	-0.12	-0.08	-0.05	-0.08	-0.14	-0.22	0.53	0.48	0.43	0.40	0.39	0.40	0.41	0.42	0.43	0.43
6	-0.13	-0.13	-0.12	-0.10	-0.12	-0.16	-0.22	0.53	0.47	0.41	0.40	0.38	0.37	0.40	0.38	0.38	0.37	0.37
7	-0.10	-0.13	-0.14	-0.15	-0.18	0.57	0.51	0.45	0.38	0.36	0.34	0.32	0.33	0.32	0.31	0.31	0.29	0.31
8	-0.14	-0.16	-0.17	0.63	0.61	0.57	0.51	0.46	0.42	0.39	0.37	0.35	0.35	0.34	0.33	0.33	0.34	0.36
9	0.64	0.61	0.57	0.55	0.51	0.48	0.42	0.38	0.33	0.29	0.28	0.28	0.28	0.27	0.26	0.28	0.30	0.33
10	0.56	0.51	0.48	0.44	0.40	0.35	0.33	0.29	0.24	0.21	0.21	0.20	0.20	0.20	0.19	0.21	0.23	0.27
11	0.63	0.58	0.54	0.50	0.46	0.43	0.38	0.34	0.30	0.26	0.25	0.23	0.23	0.24	0.24	0.26	0.30	0.33
12	0.50	0.46	0.42	0.38	0.37	0.34	0.30	0.27	0.23	0.20	0.18	0.17	0.17	0.19	0.21	0.24	0.26	0.30
13	0.54	0.49	0.45	0.43	0.41	0.38	0.34	0.29	0.26	0.22	0.20	0.19	0.21	0.23	0.25	0.27	0.30	0.33
14	0.41	0.36	0.34	0.31	0.30	0.28	0.25	0.20	0.18	0.17	0.16	0.17	0.19	0.22	0.22	0.25	0.27	0.30
15	0.45	0.39	0.36	0.34	0.32	0.29	0.27	0.23	0.21	0.21	0.22	0.22	0.24	0.25	0.26	0.29	0.31	0.34
16	0.37	0.33	0.31	0.29	0.26	0.25	0.24	0.21	0.20	0.20	0.22	0.22	0.24	0.26	0.28	0.29	0.32	0.35
17	0.33	0.29	0.26	0.25	0.24	0.21	0.19	0.18	0.18	0.19	0.21	0.21	0.23	0.25	0.26	0.29	0.31	0.33
18	0.25	0.22	0.21	0.19	0.15	0.14	0.13	0.13	0.15	0.15	0.17	0.17	0.20	0.22	0.24	0.27	0.29	0.30
19	0.27	0.23	0.21	0.19	0.17	0.17	0.16	0.18	0.18	0.18	0.21	0.21	0.22	0.24	0.26	0.27	0.29	0.32
20	0.26	0.25	0.21	0.20	0.18	0.20	0.21	0.22	0.22	0.22	0.25	0.25	0.27	0.29	0.29	0.29	0.31	0.33
21	0.28	0.24	0.22	0.20	0.21	0.23	0.24	0.23	0.23	0.25	0.27	0.28	0.30	0.30	0.31	0.31	0.33	0.35
22	0.20	0.18	0.16	0.17	0.18	0.20	0.22	0.23	0.25	0.26	0.29	0.29	0.30	0.31	0.31	0.32	0.35	0.36
23	0.15	0.14	0.14	0.14	0.15	0.17	0.19	0.21	0.22	0.23	0.25	0.24	0.26	0.25	0.25	0.27	0.29	0.31
24	0.14	0.15	0.15	0.17	0.20	0.24	0.26	0.27	0.27	0.29	0.30	0.31	0.31	0.32	0.33	0.35	0.38	0.39
25	0.15	0.16	0.17	0.19	0.22	0.25	0.27	0.27	0.27	0.28	0.30	0.30	0.30	0.31	0.32	0.33	0.36	0.37
26	0.13	0.14	0.16	0.18	0.19	0.21	0.22	0.23	0.25	0.26	0.27	0.27	0.28	0.29	0.31	0.33	0.35	0.37
27	0.14	0.16	0.19	0.22	0.23	0.25	0.25	0.26	0.27	0.28	0.29	0.30	0.30	0.33	0.33	0.36	0.39	0.40
28	0.18	0.19	0.22	0.23	0.25	0.26	0.26	0.26	0.26	0.25	0.27	0.26	0.28	0.30	0.31	0.32	0.34	0.36
29	0.16	0.20	0.22	0.23	0.24	0.26	0.25	0.25	0.25	0.24	0.24	0.25	0.27	0.28	0.29	0.31	0.33	0.35
30	0.23	0.27	0.27	0.28	0.28	0.29	0.29	0.29	0.27	0.26	0.27	0.27	0.27	0.29	0.30	0.31	0.34	0.36
31	0.28	0.31	0.31	0.32	0.34	0.34	0.34	0.33	0.32	0.33	0.33	0.33	0.33	0.35	0.36	0.37	0.39	0.42
32	0.40	0.40	0.39	0.41	0.41	0.41	0.39	0.38	0.36	0.36	0.35	0.35	0.37	0.38	0.39	0.40	0.42	0.43
33	0.41	0.42	0.42	0.42	0.42	0.43	0.39	0.39	0.38	0.38	0.38	0.39	0.40	0.41	0.42	0.44	0.45	0.45
34	0.48	0.47	0.46	0.46	0.47	0.45	0.44	0.42	0.41	0.40	0.40	0.40	0.40	0.41	0.42	0.42	0.44	0.44
35	0.55	0.52	0.51	0.52	0.50	0.48	0.47	0.44	0.44	0.44	0.44	0.43	0.43	0.44	0.45	0.45	0.45	0.46
36	0.59	0.57	0.56	0.54	0.52	0.50	0.49	0.47	0.47	0.47	0.47	0.46	0.47	0.48	0.48	0.48	0.48	0.50

Note: The first column represents the number of months used to calculate the past cumulative return in order to rank the stocks. The first line represents the number of months that the zero-cost portfolios will be maintained after the formation date. The alphas of the 1296 strategies are estimated by *OLS* method with returns between Jan/2005 and June/2012. The values above are expressed in percentage numbers. The numbers in bold font indicate that their p-value are below the 5% significance level. The statistical significance of the alphas considers standard errors corrected by Newey-West with 1 lag. The shaded cells represent the strategies that generated a positive average nominal return and are considered momentum strategies. All the blank cells indicate reversal strategies.