Contrarian Profits and the Overreaction Hypothesis: The Case of the Athens Stock Exchange

by

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Abstract

This paper investigates the existence of contrarian profits and the sources of these profits, for the Athens Stock Exchange (ASE). The empirical analysis decomposes contrarian profits to sources due to common factor reaction, overreaction to firm-specific information, and profits not related to the previous two terms, as suggested by Jegadesh and Titman (1995). Furthermore, the paper examines (i) size-sorted sub-samples that are rebalanced annually, and (ii) whether the results are due to the well-known January seasonal. The findings suggest that, when January returns are excluded, contrarian profits in the ASE are due more to firm specific overreaction than reaction to a common factor. This implies that the delayed reaction phenomenon in the ASE is restricted to January. This result is reinforced when we allow for time variations in factor sensitivities.

JEL Classification: G1

Keywords: Overreaction, Delayed reaction, Contrarian Profits, Emerging Stock Markets

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1. Introduction

Negative serial correlation of stock returns has been very well documented in the literature over the last 30 years in relation to both developed and emerging equity markets. Only recently, however, such return reversals have been considered to be economically important for. This view is based mainly on empirical evidence that short-horizon contrarian strategies consistently make substantial arbitrage profits. Such profits have been attributed to either over-reaction or under-reaction of investors to new information. The identification of the precise source of contrarian profits is very important for the success of such strategies. This is particularly important since it is well documented that negative serial correlation of stock returns could be due to changes in expected returns or risk. In this case any perceived profits could be due to taking risky positions rather than the success of the contrarian strategy.

While return reversals, over- and under-reaction and contrarian strategies have been investigated for the developed markets, very little research has been carried out in the context of emerging markets. However, given the characterising features of emerging capital markets, namely thin trading, low liquidity, possibly less informed and rational investors, one would expect more return predictability and contrarian profits in these markets. Emerging market investors may either place too much faith in their own forecasts, thus introducing bias to their actions (Dabbs et al., 1991), or may not respond instantaneously to information (Schatzberg and Reiber 1992). That is, uninformed traders may delay their response to see how informed market participants behave, because either their information is not reliable or they do not have the resources to fully analyse the information.

This paper seeks to contribute to the literature by evaluating the profitability of contrarian strategies in the emerging Athens Stock Exchange (ASE hereafter) and by decomposing the sources of contrarian profits. To this end, the paper examines price reactions to common factors and firm-specific information. Such decomposition should make possible the evaluation of the economic significance of any overreaction or delayed reaction, since systematic overreaction to firm specific information has been shown to contribute to contrarian profits, while systematic overreaction to common factors could either increase or decrease them. Thus, this decomposition should allow an evaluation of the extent to which over- or under-reaction to firm specific information has the same impact on contrarian profits as over- or under-reaction to common factors. More specifically, the paper seeks to address the following questions: are Greek equity returns predictable and can short-horizon contrarian strategies lead to significant profits? If yes, are these contrarian profits due to systematic risk-bearing compensation in an efficient market context or are they due to a market anomaly? If market anomalies are the cause of such profits, to what extent does the market's differential reaction to firm-specific and market-wide factors contribute to the contrarian profits? Answers to these questions will provide market participants with a thorough understanding of the causes of contrarian profits and the ways in which successful strategies can be constructed.

The empirical methodology adopted in the paper builds on the procedure suggested by Jegadesh and Titman (1995) and thus decomposes contrarian profits to sources due to reaction to common factors, overreaction to firm-specific information, and profits not related to the previous two terms. Furthermore, the paper examines size-sorted sub-samples that are rebalanced annually and whether the results are due to the well-known January seasonal effects. The rest of the paper is organised as follows: sections 2 and 3 discuss briefly the overreaction hypothesis and some recent developments in the ASE, section 4 describes the data, while section 5 presents the methodology and results. Section 6 concludes the paper.

2. Contrarian Profits and the Overreaction Hypothesis

In informationally efficient markets security prices should fully reflect all available information and, as a result, it should not be possible to make abnormal profits by trading on the basis of past information. A serious challenge of this efficient market hypothesis comes from DeBondt and Thaler (1985) who find that extreme prior losers tend to outperform prior winners during the following years by about 25%. In addition, loser portfolios seemed to experience exceptionally large January returns as late as five years after portfolio formation. The authors argued that their findings suggest that equity prices systematically overshoot due to excessive investor optimism and pessimism. This investor overreaction to information implies that price reversals may be predictable from past information, a fact that directly contradicts the efficient market hypothesis, in its weak form. In a follow-up study, DeBondt and Thaler (1987) offer additional evidence consistent with the overreaction hypothesis. In particular, they find that excess return for losers in the test period (and particularly in January) are negatively related to both long-term and short-term formation period performances. Also, the winner-loser effect neither can be attributed to changes in risk (as measured by models such as the Capital Asset Pricing Model), nor it is primarily a size-effect.

In subsequent studies, Jegadesh (1990) and Lehman (1990) find that contrarian strategies are also profitable for short-term horizons. For instance, Lehman finds that costless portfolios of securities that had positive returns in one week typically had negative returns in the following week, while portfolios with negative returns in one week typically had positive returns in the next week. Zarowin (1990) argued that the tendency of losers to outperform winners in the USA is not due to investor overreaction, but to the tendency of losers to be smaller sized firms than winners. Thus, the overreaction hypothesis does not apply to larger firms, for which the efficient market hypothesis still holds. This is in agreement with the findings of Clare and Thomas (1995), who used UK data and their results seem to also suggest that overreaction is attributable to the size-effect. Conrad and Kaul (1993) suggested an explanation of the overreaction hypothesis that rests on bid-ask biases and infrequent trading, while Chan (1988) and Ball and Kothari (1989) argued that the effect is due to changes in the equilibrium required returns, for which DeBondt and Thaler (1985) did not control. Finally, there are a numbers of studies that attempted to explain return predictability within an overreaction and/or underreaction context employing behavioural models [Barberis, Shleifer, and Vishny (1997), Amir & Ganzach (1998)].

Overreaction may not be the only source of contrarian profits. Lo and MacKinlay (1990) argued that, when some stocks react more quickly to information than others (i.e. their returns lead the returns of other stocks), a contrarian strategy may still produce profits, even if neither stock overreacts to information. Their findings seem to suggest that a lead-lag relationship among returns is an important factor that contributes to contrarian profits. However, Jegadesh and Titman (1995) found that although stock prices react with a delay to common factors and overreact to firm-specific information, the delayed reactions cannot be exploited by contrarian strategies. In other words, they found that the primary source of observed contrarian profits is the reversal of the firm-specific component of return.

Among the studies that examine markets outside the USA, DaCosta and Newton (1994) tested the overreaction hypothesis for the Brazilian stock market and reported that stock prices exhibit higher price-reversals than the AMEX or NYSE. According to the authors these results cannot be explained by risk. Similar findings were confirmed by Bowman & Iverson (1998), who used weekly observations to examine the overreaction hypothesis for the New Zealand Stock Exchange. Grinblatt & Keloharju (2000), in a study of the Finnish Stock Exchange, reported that foreign investors appear to follow momentum strategies, while domestic investors –especially less sophisticated households- follow contrarian strategies. In other words, the more sophisticated an agent the closer he was to momentum strategies, and the further away from contrarian strategies. The evidence also showed that foreign momentum traders outperformed domestic contrarians. Richards (1997) examined most developed equity markets around the world and reported that, on average, there is a twelve-month lag before the contrarian strategy had any profits in the test period. Taking total risk, size, seasonalities and the state of the economy into account did not significantly altered returns. Finally, in a recent study, Baytas & Cakici (1999) examined the US, Canadian, UK, Japanese, German, French, and Italian equity markets and found that loser (winner) portfolios outperformed (under-performed) market portfolios in the next one, two and three year periods, for all countries except for the US, and Canada. Three-year arbitrage returns were positive and significant except for the US market. The average return for the arbitrage portfolio ranged from 12.4% in Canada to 94.5% in Japan. They also found an asymmetric effect for winners and losers.

In summary, while most studies found positive evidence for contrarian strategies, there is considerable disagreement as to the causes behind these results. The following are some of the explanations put forward in the literature: (i) overreaction (Pettengill & Jordan 1990, De Bondt and Thaler 1985, 1987, and Lehmann 1988) and/or underreaction (Mendenhall 1991, Abarbanell & Bernard 1992) to firm specific information; (ii) seasonality effects (Chopra, Lakanishok & Ritter 1992); (iii) size effects (Clare & Thomas); (iv) lead-lag explanations (Lo & Mackinley 1990); (v) changes in risk (Chan 1988, Ball & Kothari 1989) and microsturcture biases (Kaul & Nimalendran 1990, Kaul, Conrad & Gultekin 1997) within an efficient market context; and (vi) behavioural aspects (Barberis, Shleifer and Vishny 1997, Amir & Ganzach 1998). Given the above variety of explanations and contexts in which contrarian profits have been justified, it is important to continue to investigate the source of such profits. This issue becomes even more important for emerging markets, which are notoriously more prone to change and anomalous behaviour.

3. The Athens Stock Exchange

During much of the 1980s Greece applied a set of heavy restrictions on capital and foreign exchange markets. This made it very difficult for international investors to access local markets. However, following the adoption of European Community legislation that aimed to deregulate member states' capital markets, a wave of financial market deregulation occurred during the late 1980s and early 1990s. For much of this period, the Greek financial system was still characterised by a strong commercial banking sector that dominated equity markets. As a result, local firms, which were often characterised by family ownership, traditionally turned to banks for capital, despite the fact that an organised equity market, the Athens Stock Exchange, has been functioning for almost 120 years. More recently, this has changed with business increasingly turning to the equity market for capital. The number of listed companies in the ASE more than doubled in the 1990s. Market capitalisation grew from Dr 566 billion in 1987, to Dr 4,094 billion in 1995 and well above Dr 30,000 billion in 1999. Furthermore, the equity market capitalisation as a percentage on nominal GDP grew from 20% in 1995 to above 100% in 1999. The annual value of trade increased from nearly Dr 60 billion in 1987 to Dr 608.7 billion in 1990 and Dr 1,407.3 billion in 1995. During 1999, daily trading volumes of Dr 300-400 billion, nearly one quarter of the annual trading volume of 1995, were not uncommon. Given the growth and changes experienced by the ASE, this is a good test case to analyse the sources of contrarian profits.

4. Data

The paper uses weekly price observations for all stocks listed on the ASE that had at least 260 consecutive observations[1], for the period between January 1990 and August 2000. As a proxy for the common factor, i.e. the market portfolio, the ASE General Price Index[2] is used. Returns are continuously compounded, defined as the first difference of the logarithmic price levels. All data were collected from Datastream.

Stocks are assigned to five size-sorted sub-samples that contain 25% of firms as follows: every year stocks are ranked on the basis of the previous year-end stock market capitalisation[3]. For example, to create the five sub-samples for the year 1997, all 173 stocks available for this year were sorted according to the last market value of the previous year (1996). This left us with 36 firms in the smallest sub-sample, 34 firms in the three next sub-samples, and 35 firms in the largest firms' sub-sample. The procedure was repeated every year, allowing for five size-sorted sub-samples per

[1] This avoids downward bias of the autocovariance estimates that is known to occur in small samples.

[2] The ASE GI is a value–weighted portfolio that is composed of the most heavily traded stocks that represent approximately 70% of total market capitalisation and approximately 80% of total transactions volume.

[3] We had 79 firms in the first year's subsamples, and 81, 116, 131, 137, 148, 168, 173, 173, 173, 173 firms for each of the remaining years. Market value data are obtained from Datastream.

year, for a period of eleven years. Tests are then performed on the whole sample as well as on the five sub-samples.

Table 1 presents descriptive return statistics for the five size-sorted sub-samples and the all-stock sample, and we can see that the highest mean weekly return is that of the smallest stocks sub-sample (0.56%) while the lowest is that of the medium stock sub-sample (0.25%). The highest total risk (standard error) is that of the small stock sub-sample (0.0497) while the lowest is that of the largest stock sub-sample (0.04211). Note that the smallest stock sub-sample has only the second lower total risk (0.04302). The mean weekly return for the all-stock sample lies in between (0.336%), while the standard error is the smallest (0.00273). The kurtosis coefficients indicate that returns distributions may have thicker tails than normal, while the skewness coefficients are all positive indicating skewness to the right.

5. Testing Methodologies and Results

Given that serial correlation is present in the data[4], the question arises as to whether it can lead to short-run contrarian profits. In order to examine whether such contrarian profits are exploitable, following Jegadeesh and Titman (1995) and Lo and Mackinley (1990), the paper employs a portfolio strategy that involves every week shorting the previous week's winners, and going long on previous week's losers. The arbitrage

[4] In the interest of brevity, test statistics confirming the serial correlation of portfolio returns are available from the authors upon request.

portfolios are re-balanced every week, and the profits for the portfolio, π_t, are estimated as:

$$\pi_t = -\frac{1}{N}\sum_{i=1}^{N}(r_{i,t-1} - \overline{r}_{t-1})r_{i,t}$$

where, $\overline{r}_{t-1}$ is the lagged return on an equally-weighted portfolio that contains all stocks in the sample, $r_{i,t-1}$ is the return on stock i at time $t-1$, and N is the number of stocks in the sample.

5.1. Decomposition of Contrarian Profits

In order to estimate the sensitivities of weekly equity returns in the ASE to the lagged and the contemporaneous factors, the paper uses the methodology suggested by Jegadesh and Titman (1995) (JT henceforth). Thus, the first step is to estimate the following regression:

$$r_{it} = a_i + b_{0,i} r_{M,t} + b_{1,i} r_{M,t-1} + e_{i,t} \tag{1}$$

where a_i is the unconditional expected return of stock i, r_{it} is the return of stock i at time t, r_{Mt} the return on the market portfolio at time t, $e_{i,t}$ the residuals, and $b_{0,i}$ and $b_{1,i}$ are the estimated sensitivities of stock i on the contemporaneous and lagged market returns, respectively[5].

[5] Regression (1) was estimated for each year and each sub-sample separately. This provided estimates of α_i, b_0, b_1, for each year and each sub-sample. Then, $\overline{b}_0$ and $\overline{b}_1$ were calculated as the averages of b_0 and b_1 for each sub-sample and each year.

An estimate of the potential contribution to contrarian profits of the differences in the timing of stock price reactions to the common factors can be provided by the cross-sectional covariance of contemporaneous and lagged betas:

$$\hat{\delta} = \frac{1}{\mathrm{N}} \sum_{i=1}^{\mathrm{N}} \mathrm{E}\{(b_{0,i} - \bar{b}_o)(b_{1,i} - \bar{b}_1)\} \qquad (2)$$

where, $\bar{b}_o$ is the cross sectional average of $b_{0,i}$, and $\bar{b}_1$ is the cross sectional average of $b_{1,i}$. For example, when the cross-sectional covariance of contemporaneous and lagged betas is negative ($\delta<0$) common factor reactions contribute positively to contrarian profits, while if it is positive ($\delta>0$) common factor reactions contribute negatively to contrarian profits. When the average sensitivity to the lagged factor is positive ($\bar{b}_1>0$) the contribution of common factor reactions to contrarian profits is due to underreaction, while when it is negative ($\bar{b}_1<0$) the contribution of common factor reactions to contrarian profits is due to overreaction. Note also that the product of the cross-sectional covariance of contemporaneous and lagged betas with the variance of the common factor ($-\hat{\delta}\sigma_M^2$) provides an estimate of the part of contrarian profits due to common factor reactions. Furthermore, the negative of the average autocovariance of the error term, Ω, defined as $\Omega \equiv \frac{1}{N}\sum_{i=1}^{N} \mathrm{cov}(e_{i,t}, e_{i,t-1})$, provides an estimate of contrarian profits due to overreaction to firm-specific information. The negative of the cross-sectional variance of expected returns ($-\sigma_a^2$) provides an estimate of the profits that are not due to the previous two terms.

The results from the empirical estimation of (1) appear in Table 2 and suggest that, on average, equity returns in the ASE do not fully react contemporaneously to the common factor, but react with a one-week lag. For example, the average slope coefficient on the lagged factor is 0.57997. Furthermore, this effect is not confined to small firms but it is more pronounced for medium and large firms (0.626449 and 0.636693, respectively). In fact, it is less pronounced for the smallest stocks than any other sub-sample of stocks. The cross-sectional covariance of contemporaneous and lagged betas ($\hat{\delta}$) is negative for all sub-samples and all stocks, suggesting that common factor reactions could contribute positively to contrarian profits. This is consistent with the findings of JT for US stocks.

The lower part of Table 2 reports tests of the magnitude of the contribution of the lead-lag effect. As discussed above, since the average sensitivity to the lagged factor is positive the contribution of common factor reactions to contrarian profits is due to underreaction. The term ($-\hat{\delta}\sigma_M^2$) provides an estimate of the part of contrarian profits due to common factor reactions (underreaction in this case) and is relatively small for the full sample (0.003744). However, it grows bigger as we move from the largest stock sub-sample (0.000392) to the smallest stock sub-sample (0.3513), with a peak at the medium stock sub-sample. This suggests that underreaction to the common factor contribute less to the contrarian profits of large firms and more to the contrarian profits of medium to small firms. On the other hand, the negative of the average autocovariance of the error term, *(-Ω)*, that provides an estimate of contrarian profits due to overreaction to firm-specific information, is quite large for the full sample. However, it grows smaller as we move from the largest stock sub-sample (0.732611) to the smallest stock sub-sample (0.04354), suggesting that overreaction to firm-specific information contributes more to the contrarian profits associated with large firms, and less to the contrarian profits associated with small firms. The effect of $(-\sigma_a^2)$ is very small for the full sample (-0.00733), however, it also grows larger as we move from the largest stock sub-sample (-0.06529) to the smallest stock sub-sample (-0.24085), suggesting larger unexplained contrarian profits for the smallest firms.

Thus far, the results of Table 2 indicate that equity returns in the ASE do not fully react contemporaneously to the common factor, but react with a one-week lag. Furthermore, for all stocks, the contribution of the overreaction to the firm-specific component (0.143985) is much larger than the underreaction to the common factor (0.003744). In addition, the contribution of overreaction to the firm-specific component grows steadily as we move from the smallest sub-sample to the largest sub-sample, while the reverse is true for the underreaction to the common factor.

5.2. Time-varying Factor Sensitivities

The above results might be biased due to the fact that this decomposition of contrarian profits assumes constant factor sensitivities. In particular, the lead-lag structure is likely to be biased downwards and the contribution of firm-specific overreaction is likely to be biased upward (JT, p. 986). In order to account for time-variation in factor sensitivities, the paper employs the following decomposition of contrarian profits, π_t. In the first instance, the following regression is estimated:

$$\pi_t = \alpha_0 + \alpha_1 (r_{M,t-1} - \bar{r}_M)^2 + \gamma\theta_{t-1} + u_t \qquad (3)$$

where,

$$\theta_t = \frac{1}{N}\sum_{i=1}^{N} e_{i,t}^2 \qquad (4)$$

$\bar{r}_M$ is the average common factor return, and $e_{i,t}$ are the residuals estimated from equation (1).

Then, an estimate of the contrarian profits due to delayed reactions to the common factor is given by the product of α_1 and the variance of the common factor ($\alpha_1\sigma_M^2$), while an estimate of contrarian profits due to overreaction is given by:

$$\gamma(\frac{1}{T}\sum_{t=1}^{T}\theta_{t-1}) \qquad (5)$$

The results from this decomposition of contrarian profits (equation 3) are presented in Table 3. The constant coefficient estimates are statistically insignificant with the exception of the constant estimates in the large stock sub-sample. The slope coefficient estimates (α_1), which give the contrarian profits due to the common factor reaction, are statistically insignificant with the exception of the slope estimates in the small stocks sub-sample. However, the estimates of γ, which give the overreaction to firm-specific information, are statistically significant at 5% level for the whole sample and statistically significant at 10% level for the small stock sub-sample. For example, the estimate of contrarian profits due to firm-specific overreaction for the all-stocks sample, given by (5), is approximately 0.348088. Since the average weekly contrarian profit is 0.26, the contrarian profits due to firm-specific overreaction for all-stocks are 133.1% (0.348088 / 0.26).

To summarise thus far, when the assumption of constant common factor sensitivities through time is dropped, most of the contrarian profits are due to overreaction to firm-specific information and the magnitude of the effect is much higher than before. Also, the contribution of common factor underreaction to the profits is now negative for the all-stock sample[6]. This suggests that, under the more realistic assumption of time-varying betas, the importance of the firm specific component increases while the importance of the common factor reaction contribution is actually smaller.

5.3. The Effect of January

In view of recent evidence of a turn-of the year seasonal effect in the ASE (Spyrou, 1998), an important question is whether the above results are due to the well-known January-effect (Rozeff and Kinney, 1976). In order to investigate this possibility, the paper re-examines the contribution of the various factors to contrarian profits for the whole period, the full sample, and the five size-sorted sub-samples, without the first four weeks of the year, that is, for February to December. The results from re-estimating equation (1) are presented in Table 4 and are strikingly different. When January returns are excluded weekly equity returns in the ASE, on average, seem to have a much stronger contemporaneous reaction to the common factor. For example,

[6] The term $\forall_1 \Phi^2_M$, that provides an estimate of contrarian profits due to common factor reaction, is approximately –0.009733. This suggests that contrarian profits due to common factor under-reaction for the all-stock sample are –3.7%.

the average slope coefficient on the contemporaneous factor is 0.600635 (0.252241 when January is included), while the average slope coefficient on the lagged factor is -0.11313 (0.57997 when January is included). For all size-sorted sub-samples the slope coefficient on the contemporaneous factor is now much higher than before. In addition, the slope coefficient on the lagged factor is now much lower and negative, which suggests that the underreaction to the common factor documented in Table 2 is confined to the month of January.

Since both $\hat{\delta}$ and the average sensitivity to the lagged factor ($\bar{b}_1$) are negative, for all sub-samples and all stocks (with the exception of the medium stock sub-sample), a positive contribution of common factor reactions to contrarian profits can be expected and this contribution is likely to be due to over-reaction. The term $-\hat{\delta}\sigma_M^2$ is now bigger for the full sample (0.009237) and, in contrast to the results in Table 2, it becomes smaller as we move from the largest stock sub-sample (0.298425) to the smallest stock sub-sample (0.158097). This suggests that the reaction to common factors contributes more to the contrarian profits of large firms and less to the contrarian profits of medium to small firms, when January returns are excluded from the sample.

The negative of the average autocovariance of the error term, -*Ω*, is still quite large for the full sample and still becomes smaller as we move from the largest stock sub-sample (0.790513) to the smallest stock sub-sample (0.123658). This indicates that overreaction to firm-specific information contributes more to the contrarian profits of large firms, and *less* to the contrarian profits of small firms, irrespective of any seasonal effects. The effect of ($-\sigma_a^2$) is very similar to the previous findings.

The results for re-estimating equation (3) are presented in Table 5 and it can be seen that the γ estimates are statistically significant for all but the medium and large stocks. For example, $\gamma(\frac{1}{T}\sum_{t=1}^{T}\theta_{t-1})$ for the all-stocks sample is now 0.354233 (approximately 0.3481 for the January-December sub-sample), which suggests that contrarian profits due to firm-specific overreaction for all-stocks are 141.69%. The term $\alpha_1\sigma_M^2$, which provides an estimate of contrarian profits due to common factor reaction, is approximately 0.000401, which suggests that contrarian profits due to common factor overreaction for all-stocks are 0.1604%. Overall, when we do not require constant factor sensitivities through time, the results indicate that overreaction to firm-specific information contributes significantly more to contrarian profits than reaction to common factor realisations.

5. Conclusion

The paper investigates the existence of contrarian profits and the sources of these profits for the Athens Stock Exchange. Contrarian profits are decomposed to sources due to common factor reaction, overreaction to firm-specific information and profits not related to the previous two terms. The paper presents evidence of contrarian profits in the ASE and find that such profits seem to be due more to firm specific overreaction, than reaction to common factors, when January returns are excluded. This implies that the delayed reaction phenomenon in the ASE is restricted to January. In other words, the reaction to the common factor seems to play a very small role in explaining contrarian profits, once January is excluded from the sample. This result is reinforced when we allow for time variations in factor sensitivities. Thus, the findings suggest that overall contrarian profits can be made in the ASE because of overreaction to firm-specific information. That is, contrarian profits appear to be genuine arbitrage profits due to the existence of inefficiency in the market, rather than changes in risk.

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Table 1
Descriptive Statistics of Stock Returns

	All Stocks	Smallest Stocks	Small Stocks	Medium Stocks	Large Stocks	Largest Stocks
Mean	0.00336	0.00562	0.004153	0.00250	0.00266	0.00295
Standard Error	0.00273	0.04302	0.049796	0.04947	0.04809	0.04211
Minimum	-0.00444	-0.24272	-0.28733	-0.31075	-0.25074	-0.15236
Maximum	0.01589	0.20219	0.26842	0.26285	0.25226	0.18244
Skewness	0.38946	0.31893	0.11012	0.15872	0.23294	0.35052
Kurtosis	2.90071	6.01931	7.69008	7.27277	4.96318	2.68803

Table 2
Average estimates of stock return sensitivities to current and lagged market returns and decomposition of contrarian profits

$$r_{it} = a_i + b_{0,i} r_{M,t} + b_{1,i} r_{M,t-1} + e_{i,t}$$

	$\bar{b}_o$	$\bar{b}_1$	$\hat{\delta}$
Smallest Stocks	0.130258	0.467243	-0.24548
Small Stocks	0.228938	0.59909	-0.32699
Medium Stocks	0.241757	0.626449	-0.32922
Large Stocks	0.319826	0.636693	-0.34359
Largest Stocks	0.344987	0.576341	-0.27367
Average	**0.252241**	**0.57997**	**-0.29972**
All Stocks	0.761657	0.12377	-0.00262
	$-\hat{\delta}\sigma_M^2$ x10^3	-Ω x10^3	$-\sigma_a^2$ x10^3
Smallest Stocks	0.35130	0.04354	-0.24085
Small Stocks	0.467934	0.222327	-0.19672
Medium Stocks	0.471126	0.44381	-0.14094
Large Stocks	0.000492	0.505366	-0.13139
Largest Stocks	0.000392	0.732611	-0.06526
All Stocks	0.003744	0.143985	-0.00733

Table 3
Decomposition of contrarian profits with time-varying factor sensitivities

$$\pi_t = \alpha_0 + \alpha_1 (r_{M,t-1} - \bar{r}_M)^2 + \gamma\theta_{t-1} + u_t$$

	α_0 x 10^3	α_1 x 10^3	γ x 10^3	$\alpha_1\sigma_M^2$ x 10^3	$\gamma(\frac{1}{T}\sum_{t=1}^{T}\theta_{t-1})$ x 10^3
Smallest Stocks	-0.13912	-26.53081	25.0302	-0.052572	0.155236
	(-0.91217)	(-1.02086)	(1.48127)		
Small Stocks	-0.189681	105.1229	39.66019	0.208304	0.245971
	(-0.96999)	(3.15477)	(1.83054)		
Medium Stocks	0.160431	25.15955	13.12696	0.049854	0.081413
	(0.97789)	(0.89998)	(0.72219)		
Large Stocks	0.34148	27.70413	7.594781	0.054891	0.047103
	(2.04439)	(0.97326)	(0.41039)		
Largest Stocks	0.484541	-34.83005	79.06886	-0.069017	0.490382
	(1.05674)	(-0.44578)	(1.55641)		
All Stocks	-0.084476	-4.91200	56.12544	-0.009733	0.348088
	(-0.86774)	(-0.30673)	(5.21102)	[-0.0370]	[1.3388]

Notes to Table 3:
t-statistics appear in parentheses.
Numbers in bracket are ratios of each component relative to the average contrarian profit from Table1.

Table 4
Average estimates of stock return sensitivities to current and lagged market returns and decomposition of contrarian profits (Feb-Dec)

$$r_{it} = a_i + b_{0,i} r_{M,t} + b_{1,i} r_{M,t-1} + e_{i,t}$$

	$\bar{b}_o$	$\bar{b}_1$	$\hat{\delta}$
Smallest Stocks	0.419757	-0.04015	-0.07856
Small Stocks	0.570737	-0.05725	-8.78E-02
Medium Stocks	0.640478	-0.05725	1.69E-02
Large Stocks	0.669506	-0.17315	-1.66E-01
Largest Stocks	0.710011	-0.23921	-1.48E-01
Average	**0.600635**	**-0.11313**	**-0.09903**
All Stocks	0.77404	0.11479	-0.00459
	$-\hat{\delta}\sigma_M^2$ x10^3	-Ω x10^3	$-\sigma_a^2$ x10^3
Smallest Stocks	0.158097	0.123658	-0.27983
Small Stocks	0.176644	0.309953	-0.2941
Medium Stocks	-0.03403	0.538613	-0.23601
Large Stocks	0.334106	0.493806	-0.17294
Largest Stocks	0.298425	0.790513	-0.14552
All Stocks	0.009237	0.150036	-0.00755

Table 5
Decomposition of contrarian profits with time-varying factor sensitivities (Feb-Dec)

$$\pi_t = \alpha_0 + \alpha_1 (r_{M,t-1} - \bar{r}_M)^2 + \gamma\theta_{t-1} + u_t$$

	α_0 x 10^3	α_1 x 10^3	γ x 10^3	$\alpha_1\sigma_M^2$ x 10^3	$\gamma(\frac{1}{T}\sum_{t=1}^{T}\theta_{t-1})$ x 10^3
Smallest Stocks	-0.275385	-21.66785	39.46819	-0.043201	0.243859
	(-1.76074)	(-0.82492)	(2.13251)		
Small Stocks	-0.20182	36.52838	64.89602	0.07283	0.400969
	(-0.96399)	(1.03892)	(2.61948)		
Medium Stocks	0.113977	87.96631	-0.304266	0.175386	-0.00188
	(0.65439)	(3.00730)	(-0.01476)		
Large Stocks	0.434047	-6.150349	-2.898314	-0.012262	-0.017908
	(2.65926)	(-0.22437)	(-0.15006)		
Largest Stocks	0.035623	-123.1932	194.1932	-0.245621	1.203013
	(0.07247)	(-1.49235)	(3.34740)		
All Stocks	-0.10555	0.201009	57.33193	0.000401	0.354233
	(-1.04151)	(0.11861)	(5.19505)	[0.001604]	[1.4169]

Notes to Table 5:
t-statistics appear in parentheses.
Numbers in bracket are ratios of each component relative to the average contrarian profit from Table1.