Anomaly Timing

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Abstract

We construct simple timing strategies for the anomaly portfolios based on the lagged return on the market. These strategies have similar or higher Sharpe ratios than the corresponding anomaly portfolio, with lower volatility, and remain profitable for relatively high levels of transaction costs. They have positive, often significant, alphas with respect to factor models that explain the returns on the anomaly portfolios well. These alphas are accounted for by adding an upside risk factor. Our results indicate that much of the high return or upside of the anomaly portfolios is correlated with the state of the market.

JEL Classifications: G11, G12

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Anomaly Timing

The returns on portfolios of common stocks sorted by market capitalization (Banz, 1981), book-to-market ratios (Fama and French, 1993) and past return (Jegadeesh and Titman, 1993) have been termed anomalies as these cannot be explained by the Capital Asset Pricing model (Sharpe, 1964). Recent research has focused on the time-variation in the expected returns of these portfolios and has modelled the factor risk premiums as functions of business cycle and other macro-economic variables in an attempt to explain them[1]. A few recent studies have examined the relations between the returns on the anomaly portfolios and the state of the market. Cooper, Gutierrez and Hameed (2004) show that positive momentum profits follow up market states while negative returns follow down market states. Statman, Thorley and Vorkink (2006) find that when the market rises, trading activities also rise. These findings suggest that the returns on the anomaly portfolios may be correlated with the state of the market and hence the state of the market might be a good signal for timing anomaly portfolios.

Motivated by the above we construct and study the performance of very simple timing strategies that invest in the primitive asset (the anomaly portfolio) on a given month if the return on the CRSP Value Weighted index in the previous month was either positive (the type I timing strategy; hereafter) or greater than 2% (the type II timing strategy; hereafter); otherwise invest in the 1 month Treasury bills which are regarded as risk free assets. These timing strategies are long only and are easier to implement than, for example, the combined long short trading positions of momentum strategies. The timing strategies attempt to

[1] Chan and Chen (1988) and Ball and Kothari (1989) were the first to suggest that time-varying betas could provide an explanation of asset pricing anomalies. Jagannathan and Wang (1996), Lettau and Ludvigson (2001), Chordia and Shivakumar (2002), Lustig and Van Nieuwerburgh (2004), Santos and Veronesi (2006), and Ang and Chen (2007) consider the CAPM or C-CAPM with betas modeled as functions of various lagged macro-economic variables. Ferson and Harvey (1999) and Avramov and Chordia (2006) consider multiple factor models with time-varying betas.

capture the upside returns on these portfolios and avoid the downside losses. If our timing signal is indeed reliable then we would expect the timing strategies to have similar or better risk reward profiles than the corresponding anomaly portfolios, while having lower volatility.

We evaluate these strategies over the period between 1975 and 2006 and find that the timing strategies outperform the primitive anomaly portfolios in terms of Sharpe ratio while having considerably lower volatility. The type I strategies capture as much as 79% of the extreme up moves of the primitive assets while the down moves ratio for the type II strategies is as low as 10%, showing that successful timing can be achieved by capturing the upside as well as avoiding the downside. We also find that the timing strategies remain profitable after assuming transaction costs up to 2.5%, with the strategy based on the winner decile portfolio having post transaction cost Sharpe ratios as high as 0.6. This shows that winner timing could be feasible in practice.

The returns to the timing strategies cannot be explained by the factor models that explain the returns on the primitive portfolios. These strategies appear to be 'active alpha' generators in that they generate positive, often significant, alphas with low risk relative to these models. When we augment the models with an upside factor which is the maximum of the market return and zero, most of the alphas of the timing strategies with respect to this model are negative and none of the positive alphas are significant. The ability of this upside factor to capture the level of returns of these strategies and the positive and significant loading on the factor indicates that the timing strategies, in addition to being able time the corresponding anomaly portfolio, are also able to time the overall market. These findings suggest that the returns on the anomaly portfolios may be asymmetrically correlated with the state of the market (Ang and Chen, 2002; and Hong, Tu and Zhou, 2007) and thus it may be possible to construct successful real-time timing strategies that capture their upside returns.

The upside-factor augmented models, however, do not explain much more of the return variation of the timing strategies since they are unable to capture the dynamic nature of the returns on the strategies. We thus allow for the factor loadings of the original factor model to be functions of a dummy variable based on previous market return. The resulting model provides incremental explanatory power to the return variation on the timing strategies and helps capture the dynamic nature of the strategies.

The rest of the paper is structured as follows. Section I describes the timing strategies. Section II documents their risk-reward profiles and analyzes transaction costs and extreme up (down) returns of the strategies. Section III provides the methods of evaluating the performance of the primitive portfolios and timing strategies and Section IV presents the results. Section V concludes the paper.

I. The Timing Strategies

The timing strategies work in the following way. The type I timing strategies invest, in a given month, in the given primitive portfolio if the return on the market (the CRSP Value Weighted index) in the previous month was positive; otherwise invest in the risk free asset. Specifically, the time t expected return R_{si} on the type I strategy s that times the primitive portfolio i using the market return R_m at time t - 1 as an investment signal is:

$$E\left(R_{sit} \middle| R_{mt-1} > 0\right) = R_{it}$$

and

$$E\left(R_{sit} \middle| R_{mt-1} \leq 0\right) = R_{ft} \qquad (1)$$

where R_{it} and R_{ft} are, respectively, the return on the primitive portfolio and the 1 month Treasury bills at time t.

The type II timing strategies require a more restrictive threshold and only invest in the given primitive portfolio in a given month if the market return in the previous month was greater than 2%; otherwise invest in the 1 month Treasury bills. In other words, the time *t* expected return R_{si} on the type II strategy *s* that times portfolio *i* is:

$$E\left(R_{sit} \middle| R_{mt-1} > 2\%\right) = R_{it}$$

and

$$E\left(R_{sit} \middle| R_{mt-1} \leq 2\%\right) = R_{ft} \tag{2}$$

where R_{mt-1} is the return on the CRSP Value Weighted index at time *t* - 1.

We test the strategies from February 1975 to December 2006. The primitive portfolios include the decile portfolios as well as the portfolios comprised of the stocks within the top and bottom 30% of the sorting criteria including returns realized over the past 1 year (momentum), book-to-market equity ratio, and market value of equity (size). We also consider the decile portfolios based on long-term past returns (reversal)[2]. The sample covers the period between 1975 and 2006. The portfolios constructed each month include the stocks contained in the NYSE, AMEX, and NASDAQ of the CRSP and Compustat files. The momentum winner and loser portfolios are based on the previous 2-12 month returns. The reversal portfolios are constructed at time *t* based on returns in months *t*-60 to *t*-13 and are held for 4 years. The book-to-market portfolios are formed on the basis of the book-to-market equity ratio at the end of each June using NYSE breakpoints. The book value used in June of year *t* is the book equity for the last fiscal year end in *t*-1. Market equity is price times shares outstanding at the end of December of *t*-1. The size portfolios are constructed at the end of each June using the June market equity and NYSE breakpoints.

Table I reports the risk and return profiles of the primitive portfolios. The momentum winner decile portfolio has a Sharpe ratio of 0.66 with an annual volatility of 22%. The winner third portfolio has a considerably higher Sharpe ratio of 1.23 with a lower volatility of 16.38%. The loser decile portfolio is the only primitive asset that has a negative Sharpe ratio of -0.07 with a return volatility of 25.6%. In contrast, the loser third portfolio has a

[2] These data are obtained from Kenneth French's data library.

positive Sharpe ratio of 0.58, but with a lower volatility of 18.20%. The proportions of downside volatility relative to total volatility of both the winner and loser decile portfolios are higher than those of the third portfolios. The highest book-to-market decile portfolio has a Sharpe ratio of 0.74 with a total volatility of 18.3% and a downside volatility of 9.76%. The high book-to-market 3rd portfolio has a Sharpe ratio of 0.75 with a total volatility of 15% and a downside volatility of around 8%. Compared with the winner and loser portfolios, these high book-to-market portfolios have considerably lower total and downside volatility. The smallest size decile portfolio has a Sharpe ratio of 0.56 with volatility of 21.1% and a downside volatility of 11.4%. The small size 3rd portfolio has a Sharpe ratio of 0.56 with volatility of 20.6% and a downside volatility of 11.6%. The Sharpe ratio of the long-term loser portfolio is 0.58 while that for the long-term winner portfolio is 0.36 showing that the long-term loser stocks outperform the long-term winner stocks.

[Insert Table I here]

II. The Returns of the Timing Strategies

A. The Returns of the Type I Strategies

Since the timing strategies switch investments to T-bills when the previous month return on the CRSP value weighted index was zero or negative, we expect the strategies to have lower volatility than those of the primitive portfolios. This could come, however, at the expense of a lower mean return and consequently leads to considerably lower Sharpe ratios. We compare the strategy Sharpe ratio, total volatility and downside volatility which is the standard deviation of the negative returns with those of the underlying primitive portfolio. Table II shows the results of the type I strategies based on the different primitive portfolios. The strategy that times the winner decile has a similar Sharpe ratio but with lower total and downside volatilities relative to the winner decile portfolio. Although the strategy that times the winner third portfolio does not improve the risk-reward profile as indicated by its lower Sharpe ratios of 1.0, it does show a reduction in total volatility from 16.4% to 12.1%.

[Insert Table II here]

Remarkably, the strategy that times the loser decile generates a positive Sharpe ratio of 0.22, in contrast to the negative Sharpe ratio of the loser decile portfolio. In addition, both the total volatility and downside volatility of this strategy are lower than those of the loser decile portfolio. These indicate that the timing strategy is able to capture more of the upside while avoiding some of the downside. The strategy that times the loser 3rd portfolio exhibits a higher Sharpe ratio of 0.72 than the primitive asset. Again, both the total volatility and downside volatility are lower than those of the loser 3rd portfolio. Interestingly, the downside volatility of this timing strategy is less than half of its total volatility, indicating that much of the volatility reduction comes from a reduction in its downside risk.

The timing strategy using the highest book-to-market decile portfolio has a higher Sharpe ratio of 0.87 and lower total volatility (12.63%) and downside volatility (6.7%) relative to the high B/M decile portfolio. The timing strategy using the high B/M third portfolio has a Sharpe ratio of 0.77 and shows both a lower total volatility of 10.14% and a downside volatility of 5.54% relative to the B/M third portfolio. The timing strategies using the smallest size decile portfolio has a higher Sharpe ratio of 0.88, a lower volatility of 15.1% and a lower downside volatility of 7.82% relative to the small size decile portfolio. The timing strategies using the small size 3rd portfolio has a higher Sharpe ratio of 0.81, a lower volatility of 14.3% and lower downside volatility of 7.7% relative to the small size third portfolio. Finally, the strategy that times the long-term winner decile has a Sharpe ratio of 0.37 and the strategy that times the long-term loser decile portfolio also displays a higher Sharpe ratio of 0.64 than the loser decile.

Overall, the type I strategies based on for all primitive assets but the winner portfolios improve the risk adjusted performance. All the average returns of the strategies are positive.

All individual *p*-values of the strategies are sufficiently small to be statistically significant after considering the potential number of portfolios of the same sort. The Bonferroni adjusted probabilities for observing the *p*-values are all highly significant.

B. The Returns of the Type II Strategies

Table III shows the performance of the more restricted type II timing strategies. The timing strategy using the winner decile portfolio has a better risk adjusted performance as indicated by a higher Sharpe ratio of 0.87 than 0.63 of the type I strategy and 0.66 of the winner decile. It also has a considerably lower volatility of 12.1% compared to 15.2% of the type I strategy and 22% of the winner decile. The strategy shows an obvious reduction in the downside volatility which is less than half of its total volatility. The type II timing strategy using the winner third portfolio provides a Sharpe ratio of 1.10 with a lower volatility of 9.6% compared to the type I strategy and the winner third portfolio. Again, the downside volatility of the strategy is less than 50% of its total volatility. The type II strategy that times the loser decile generates a positive Sharpe ratio of 0.19 and further reduces the total volatility to 14.8% and downside volatility to 8.2%. The strategy that times the loser 3rd portfolio has a Sharpe ratio of 0.71. Both the total volatility and downside volatility are again further reduced from the type I strategy. These strategies have better risk-return profiles than the primitive portfolios but with lower volatility.

[Insert Table III here]

Compared with the type I strategy, the type II timing strategy using the highest book-to-market decile portfolio improves the risk-return profile by showing an even higher Sharpe ratio of 0.91 with a further reduction in total volatility of 9.36% and the downside volatility being only 3.7%. Similarly, the type II strategy using the high B/M 3rd portfolio has a higher Sharpe ratio of 0.86 than those of the type I strategy and the primitive portfolio with both the total volatility and the downside volatility being further reduced.

The type II timing strategies using size portfolios also show clear improvement in the risk-return profile. The type II strategy using the smallest size decile portfolio shows an even higher Sharpe ratio of 1.01, a lower volatility of 12.09% and a lower downside volatility of 5.33% relative to the type I strategy. Similarly, the type II strategies using the small size 3rd portfolio has a higher Sharpe ratio of 0.97, a lower volatility of 11.19% and a lower downside volatility of 5.03% relative to the type I strategy. These results suggest that small stocks experience increases in returns after market rises and also correspond to the findings of Statman, Thorley and Vorkink (2006) that small stocks experience the greatest increase in trading volume when markets rise. The type II strategy based on the long-term loser and winner portfolios further increases the Sharpe ratios to 0.73 and 0.47, respectively. Overall, the type II strategies further improve the risk reward profiles for all but the strategy based on the loser portfolios. The type II timing strategies considerably reduce both total volatility and downside volatility in that more of the volatility reduction comes from a reduction in downside volatility. All the average returns of the strategies are positive and the Bonferroni adjusted probabilities for observing the *p*-values are all highly significant.

C. Why do the Timing Strategies Work

The basic rationale behind constructing the timing strategies was to first avoid the downside losses and second to capture the upside returns. In order to further examine how well the strategies fared on either score, we define an extreme up (down) move as a monthly gain (loss) of more than 5%. We then compute the ratio of extreme up (down) moves of each timing strategy to that of the portfolio on which it is based. A high ratio of extreme up moves of a strategy to that of the primitive portfolio indicates the ability of the strategy in capturing the extreme upside returns of the primitive portfolio. A low ratio of extreme down moves of a strategy to that of the primitive portfolio indicates that the strategy avoids much of the extreme downside losses. As shown in Table IV, the down moves ratio of the type I strategies varies from as low as 38% for the high book-to-market decile portfolios to as high as 59% for the winner third portfolio. The ratios are considerably lower for the type II strategies and are as low as 10% for the high book-to-market portfolios with the highest being 33% for the long-term loser portfolio. We also see that the type I strategies capture between 57% and 79% of the extreme up moves of the primitive assets, which seems to be the primary reason for their high Sharpe ratios. The percentages are much lower for the type II strategies, ranging from 37% to 57%. Thus the high Sharpe ratios of the type II strategies appear to be a result of avoiding large down moves.

[Insert Table IV here]

D. Transaction Costs

Our timing strategies are simple long-only strategies which involve buying and selling anomaly portfolios, however, many of which might contain some small and illiquid stocks. We thus further examine whether these strategies yield a positive excess return after accounting for transaction costs. The transaction costs to our strategies only involve in buying and selling the individual stocks, as none of these strategies require short selling. The costs of rebalancing are thus likely to be lower than those of the traditional zero net-worth trading strategies, for example the momentum strategy. We estimate the transaction costs by subtracting a fixed percentage from the strategy returns every time the strategy moves in or out of the risky assets.

Assuming 1% round-way transaction costs in this setting all the type I timing strategies, except the loser decile strategy, are profitable in that they have a positive excess return after costs. In fact, the Sharpe ratio after transaction costs, which is the excess return after costs divided by the standard deviation of returns, is 0.93 on an annualized basis for the winner third strategy, 0.67 for the loser third strategy, 0.46 for the high book-to-market decile strategy and 0.53 for the small size decile strategy. All of the second type timing strategies except the loser decile strategy are also profitable and the Sharpe ratio after transaction costs is similar for the winner, loser and small size decile strategies, but considerably lower for the high book-to-market decile portfolios. Assuming 2% transaction costs for the first type strategy the winner third, loser third, book-to-market decile and small size decile strategies continue to be profitable. The winner and loser third strategies have post transaction cost Sharpe ratios of 0.72 and 0.49 respectively. For the second type strategy only the winner third and the loser third are now profitable with post transaction cost Sharpe ratios of 0.55 and 0.25, respectively. Both types of timing strategies based on the winner and loser third portfolios continue to be profitable assuming 2.5% transaction costs and the post transaction cost Sharpe ratios for the winner third strategies are 0.61 and 0.39 for the type I and type II strategies, respectively.

The winner and loser timing strategies are the ones that are likely to be subject to the highest level of transaction costs as they are likely to involve heavy trading among costly stocks as noted by LSZ (2004). We have assumed lower transaction costs than those in LSZ (2004) as our timing strategies do not involve any short selling, but considerably higher than those in Jegadeesh and Titman (2001). The profitability of these strategies indicates that momentum timing could be feasible in practice. To that end we focus on a lower transaction cost strategy by considering stocks with market capitalization of over $100 million dollars and picking the top 30 and bottom 30 performing stocks based on 6 month return. We construct equally weighted portfolios of each of these and hold for 6 months. These portfolios incur considerably lower transaction costs and timing strategies based on these would be much easier to implement. According to LSZ (2004) buying and selling these stocks incurs transaction costs of between 1% and 2%, and hence we assume 1.5% transaction costs. The type I timing winner strategy has a post transaction cost Sharpe ratio of 0.27 and the loser strategy 0.13. For the type II timing strategy the winner strategy continues to be profitable with a post transaction cost Sharpe ratio of 0.25.

III. Performance Evaluation for the Timing Strategies

A. Unconditional Performance Evaluation

We first evaluate the performance of the primitive portfolios and their associated timing strategies assuming that the return generating process follows an unconditional *K*-factor model:

$$R_{it} - R_{ft} = \alpha_i + \sum_{k=1}^{K} \beta_{ik} f_k + e_{it} \tag{3}$$

where R_{it} is the return on the primitive asset or the timing strategy at time t and R_{ft} is the 1 month treasury bill rate, f_k is the time t return on the k-th factor, and β_{ik} is the beta corresponding to the k-th factor. We consider the four factors of Carhart (1997) which includes the *MKT*, *SMB*, *HML* and *UMD*. The excess market return, *MKT*, is the return on the CRSP Value Weighted index in excess of the 1 month Treasury bill rate. The size factor, *SMB*, is defined as the monthly return difference between two portfolios that consist of large and small stocks. The factor of book-to-market ratio, *HML*, is defined as the monthly return difference between the two portfolios with high and low book-to-market equity ratio. The momentum factor, *UMD*, is the monthly return difference between the two portfolios with high and low returns over the past 2 to 12 month[3].

B. An Up-Side Factor

Since our timing strategies attempt to capture the upside returns on the primitive portfolios, while having similar or better risk reward profiles, they may have higher 'upside' market betas than the primitive portfolios. The upside market betas might be able to account for the alphas of the timing strategies that are left unexplained by factor models. To this end we

[3] The returns on these factors are obtained from Ken French's data library.

construct an upside market factor, which is defined as the maximum of the market return and zero, in order to capture the time-variation in returns of the timing strategies and add this upside factor to each of the factor models. We then compute the alpha of each of the timing strategies relative to the upside factor augmented model. The payoff to this factor is the return on the market portfolio when it is positive or zero when the market return is negative:

$$UP = Max(R_m, 0) \tag{4}$$

where R_m is the return on the market portfolio (the CRSP Value Weighted index). This construction is similar to that of Henriksson and Merton (1981) which is the maximum of R_m and the risk free rate, but our specification directly reflects the nature of our timing strategies that does not require the risk free rate to be the exercise price of the timing option. We further include this upside factor together with the above examined factors to evaluate the performance of the timing strategies.

C. Conditional Performance Evaluation

The timing strategies make use of the readily available public information in forming trading decisions and result in more complex dynamic behaviour of returns than those of the primitive portfolios. Thus a conditional evaluation approach may be more appropriate in order to judge whether the strategies have superior performance (Ferson and Schadt, 1996). We further evaluate the performance of the timing strategies using a conditional version of a *K*-factor model:

$$R_{it} - R_{ft} = \alpha_i + \sum_{k=1}^{K} \beta_{ik}(\theta, z_{t-1}) f_{kt} + e_{it} \tag{5}$$

where z_{t-1} denotes a vector of macroeconomic variables including the 1 month T-bill rate, the term spread and the default spread; θ is a vector of parameters that describe the dependence of β_{ik} on the set of the macroeconomic variables. Finally, we compare the results with those using a dummy variable that is 1 if the return on the CRSP value weighted in the previous period was positive and zero otherwise to be the conditioning variable of the factor model.

IV. The Results of the Performance Evaluation

We compare the alphas relative to the appropriate factor model and also analyze how well the factor models explain the time-variation in returns on the timing strategies. All Sharpe ratios, volatilities and alphas are annualized.

A. Evaluating the Primitive Portfolios

Table V presents the alphas and the adjusted *R*-squared with respect to the appropriate factor model for each of the four sets of the primitive portfolios. The four factor model (eq. 3) explains 92% of the return variation in the winner decile portfolio and has an insignificant and negative alpha. The four factor model explains around 90% of the variation in the returns on the loser decile portfolio which has a significantly negative alpha. The results are somewhat different for the winner third and loser third portfolios as only 55% and 66%, respectively, of their return variations are explained by the model and both have positive and significant alphas.

[Insert Table V here]

The Fama-French 3 factor model explains 80% of the return variation of the highest book-to-market decile portfolio with an insignificant alpha. The Fama-French model explains 90% of the return variation for the top third book-to-market portfolio with an insignificant alpha. The performance of the size portfolios is evaluated using the two factor model that augments the CAPM with the size factor, *SMB*. This model explains 88% of the return variation of the smallest size decile portfolio and the portfolio alpha is insignificant and almost zero. The results are similar for the small size third portfolio with the two factor model explaining 96% of the return variation on the portfolio and the portfolio alpha is insignificant and almost zero. The long-term loser portfolio has an insignificant and negative alpha relative to the four factor model which explains 76% of its return variation. The long-term winner portfolio also has an insignificant and negative alpha, with the four factor model explaining 88% of its return variation.

B. Evaluating the Type I Timing Strategies

Columns two and three of Table VI report the alphas and the adjusted R^2s with respect to the appropriate factor model for the type I timing strategies based on each of the four sets of the primitive portfolios. In contrast to the results for the winner decile, the model explains only 41% of the variation in returns on the type I strategy using the winner decile with a positive but insignificant alpha. The model shows a positive and significant alpha with the adjusted R^2 of only around 0.30 for the strategy based on the winner third portfolio. These results show that the four factor model is unable to completely capture the return variations of the timing strategies.

[Insert Table VI here]

The type I timing strategy based on the loser decile has a positive and marginally significant alpha and only around 53% of its return variation is explained by the four factor model. The results are somewhat different for the strategy based on the loser third portfolios as only 35% of its return variation is explained by the four factor model; additionally a large significant alpha is present. Overall the returns on the strategies based on the loser and the winner portfolios have positive alphas and a considerably lower fraction of their return variations is explained by the four factor model, so that the strategies appear to be ‘active alpha’ strategies.

The type I strategy that times the highest book-to-market decile portfolio has a significant alpha of 4.4% and the Fama-French 3 factor model explains 40% of its return variation. The model explains 44% of the return variation of the type I strategy based on the high B/M 3rd portfolio. Both timing strategies have higher alphas relative to those of the primitive assets. These results illustrate that the returns on the timing strategies are not explained by the risk factors that explain most of the return variation of the book-to-market portfolios. The timing strategy using the smallest size decile portfolio has a highly significant alpha of 7.7% and the two factor model explains 40% of the return variation of the strategy. The results are similar for the small size third portfolio. The two factor model explains only 48% for this timing strategy and has a highly significant alpha of 5.9%. Again, the returns on the timing strategies are not explained by the risk factors that explain most of the return variation of the size portfolios. The timing strategy using the long-term winner portfolio has an insignificant but positive alpha relative to the four factor model. The strategy using the long-term loser portfolio has a significant and positive alpha of 5.8%.

C. Evaluating the Type II Timing Strategies

Columns two and three of Table VII shows the alphas and the adjusted R^2s with respect to the appropriate factor model for the type II strategies that time each of the four sets of the primitive portfolios. The type II strategy using the winner decile has a highly significant alpha of 7.5% and the model explains only 26% of its return variation. The type II strategy using the winner third portfolio has a highly significant alpha of 8.2% with only 24% of its return variation explained by the model. The type II strategy using the loser decile has the same magnitude of alpha as the type I strategy, and around 34% of the strategy's return variation being explained by the four factor model. The alpha of the type II strategy based on the loser third portfolio is also similar in magnitude to that of the type I strategy. Again, the four factor model explains a considerably lower proportion of the return variation than that of the type I strategy.

[Insert Table VII here]

The type II strategy using the highest book-to-market decile portfolio has a higher and highly significant alpha than that of the type I strategy. The Fama-French 3 factor model explains only 20% of the return variation of this strategy. In a sharp contrast to the results in Table V, the Fama-French model only explains 24.6% of the return variation of the type II strategy based on the high B/M 3rd portfolio with an alpha which is significant at the 1% level. The type II strategy using the smallest size decile portfolio has a highly significant alpha of 8.8% and the two factor model explains only 27% of the return variation of the timing strategy. Similarly, the type II strategy using the small size third portfolio has a significant alpha of 7.4%. The two factor model explains 30% of the return variation of the strategy. The type II strategy using the long-term loser portfolio has a highly significant alpha of 8.0% relative to the four factor model. The strategy using the long-term winner portfolio also has a significant alpha of 5.8%.

D. Adding an Upside Factor

Our timing strategies appear to generate 'active alphas' relative to the factor risk models considered above since all of the timing strategies have positive alphas. In contrast, all but the loser and the winner third portfolios of the primitive assets have either negative or insignificantly positive alphas. Thus the risk factors that explain the returns on the primitive assets do not explain the returns on the timing strategies. We test how well an inclusion of the upside factor help capture the returns on the timing strategies.

Columns four and five of Tables VI, respectively, show the alphas and the adjusted R^2s with respect to the upside factor augmented model for the type I strategies. The alphas are now much lower, with a majority of them being negative, and none of the positive alphas are significant. The *F*-statistic is significant at the 5% level for the inclusion of the upside market factor for all the timing strategies except for the strategy based on the high book-to-market decile portfolio, with the majority of them being significant at the 1% level. However, the augmented models still explain less than 50% of the variations in the returns on the type I timing strategies in almost all cases.

Columns four and five of Tables VII, respectively, show the alphas and the adjusted R^2s with respect to the upside factor augmented model for the type II strategies. The addition of the upside factor leads to all the significant positive alphas becoming insignificant and none of the positive alphas are significant. The *F*-statistic is significant at the 1% level for the inclusion of the upside market factor for all the timing strategies. These results indicates that the 'upside' beta explains the level of the returns on the timing strategies over and above the standard risk factors. The role of the upside market factor appears to be more interesting as it seems to point to a more fundamental characteristic of the anomaly portfolios. The augmented models explain less than 40% of the variations in the returns on the timing strategies in all cases and less than 30% in some cases, although they do explain the level of returns. These results suggest that the timing strategies are dynamic in nature and that fixed beta models may not capture much of their return variations. Conditional models are thus worthy of detailed consideration.

E. Results of Conditional Performance Evaluation

Table VIII show the alphas and the adjusted R^2s for the type I strategies with respect to the conditional models using two different sets of conditioning information. Using macroeconomic variables as conditioning information as in Ferson and Harvey (1999), the majority of alphas are significant which indicate that the conditional models do not well explain the level of the returns on the timing strategies. We thus consider dynamic beta models that model the betas of the risk factors as functions of the dummy variable which is

1 if the return on the market index in the previous period was positive and zero otherwise. These dynamic factor models capture much more of the return variations of the timing strategies with increased adjusted R^2s. Both the magnitude and significance of alphas of the winner and loser timing strategies are reduced and none of the strategies has significant alphas except for the strategies using the winner third and loser third portfolios. The results for the type II strategies as shown in Table IX display similar pattern of the alphas and again with increased adjusted R^2s with respected to the dynamic models. Overall the variation in returns to the timing strategies is better explained by dynamic factor betas. However, the dynamic factor betas are still unable to completely capture the dynamic nature of the timing strategies based on the momentum winners and losers.

[Insert Tables VIII & IX here]

V. Conclusions

Recent evidence suggests that the returns on some of the anomaly portfolios are related to the state of the market. It may thus be possible to time these anomaly portfolios in order to capture their upside returns and avoid their downside losses. We construct simple long only timing strategies based on various anomaly portfolios, which have similar or better Sharpe ratios than the corresponding anomaly portfolio, but with lower volatility. These dynamic strategies appear to be successful at capturing the upside returns on the anomaly portfolios. They remain profitable after accounting for relatively high levels of transaction costs, particularly for those based on the winner portfolios. More interestingly, the factor models that well explain the returns on the anomaly portfolios do not explain much of the returns of the corresponding timing strategies. These strategies appear to be 'active alpha' strategies since they have positive, often significant alphas with respect to the factor models. We show that most of the alphas of the timing strategies are accounted for by an upside factor and the variation in returns is better explained by dynamic factor betas.

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Table I

Risk and Reward Profiles of the Primitive Portfolios

This table gives the average return, the *p*-value, annualized Sharpe ratio, volatility and downside volatility of the primitive portfolios constructed by stocks listed on the NYSE, AMEX, and NASDAQ. Downside volatility is the annualized standard deviation of the negative returns on a portfolio. The sample covers the period between 1975 and 2006. The Winner decile and Winner third refer to, respectively, the top decile and the top 30% of stocks sorted on previous 2-12 month returns. The Loser decile and Loser third refer to, respectively, the bottom decile and the bottom 30% of stocks sorted on previous 2-12 month return. The High BM decile and High BM third refer to, respectively, the top decile and the top 30% of stocks sorted on book-to-market ratio. The Small Size decile and Small Size third refer to, respectively, the bottom decile and the bottom 30% of stocks sorted on market capitalization. The Long-Term Winner and Loser decile portfolios are, respectively, the top and bottom deciles of stocks sorted on previous 13-60 month returns. Bonferroni *p*-value is for a joint test across portfolios sorted by the same criterion of the null hypothesis that the average return of the portfolio is zero. It is computed as the *p*-value of the individual test multiplied by the potential number of portfolios tested.

Portfolio	Average Return	*p*-value	Bonferroni *p*-value	Sharpe Ratio	Volatility	Downside Volatility
Winner decile	20.97%	1.18×10^{-7}	0.000	0.66	22.00%	12.92%
Winner third	26.69%	2.97×10^{-18}	0.000	1.23	16.38%	7.15%
Loser decile	4.65%	0.0293	0.293	-0.07	25.55%	14.97%
Loser third	17.14%	2.62×10^{-7}	0.000	0.58	18.20%	9.26%
High B/M decile	19.04%	2.14×10^{-9}	0.000	0.74	18.27%	9.76%
High B/M third	17.11%	9.76×10^{-11}	0.000	0.75	15.07%	7.97%
Small Size decile	17.59%	1.90×10^{-6}	0.000	0.56	21.07%	11.42%
Small Size third	17.34%	1.61×10^{-6}	0.000	0.56	20.62%	11.57%
Long-Term Winner decile	13.91%	1.60×10^{-4}	0.000	0.36	20.63%	12.16%
Long-Term Loser decile	18.95%	1.05×10^{-6}	0.000	0.58	22.59%	11.71%

Table II

Risk and Reward Profiles of the Type I Timing Strategies

This table gives the average return, the *p*-value, annualized Sharpe ratio, volatility and downside volatility for type I timing strategies based on the winner, loser, book-to-market, size and long-term winner and loser portfolios. The type I strategy invests in the risky asset if the previous month's return on the CRSP Value Weighted index was positive and in 1 month T bills otherwise. Downside volatility is the annualized standard deviation of the negative returns on a strategy. The strategies are considered over the 1975-2006 period. Bonferroni *p*-value is for a joint test across portfolios of the same sorts of the null hypothesis that the average return of the strategies is zero. It is computed as the *p*-value of the individual test multiplied by the potential number of portfolios tested.

Portfolio	Average Return	*p*-value	Bonferroni *p*-value	Sharpe Ratio	Volatility	Downside Volatility
Winner decile	16.06%	5.40×10^{-9}	0.000	0.63	15.20%	8.65%
Winner third	18.62%	3.05×10^{-8}	0.000	1.00	12.09%	5.52%
Loser decile	10.66%	0.001	0.014	0.22	18.82%	10.05%
Loser third	16.59%	6.30×10^{-5}	0.000	0.72	14.07%	5.93%
High B/M decile	17.50%	3.21×10^{-14}	0.000	0.87	12.63%	6.70%
High B/M third	14.25%	1.40×10^{-14}	0.000	0.77	10.14%	5.54%
Small Size decile	19.77%	6.96×10^{-13}	0.000	0.88	15.11%	7.82%
Small Size third	18.05%	4.34×10^{-12}	0.000	0.81	14.33%	7.69%
Long-Term Winner decile	12.45%	7.96×10^{-6}	0.000	0.37	15.90%	7.62%
Long-Term Loser decile	16.21%	6.18×10^{-9}	0.000	0.64	15.16%	8.76%

Table III

Risk and Reward Profiles of the Type II Timing Strategies

This table gives the average return, the *p*-value, annualized Sharpe ratio, volatility and downside volatility for the type II timing strategies based on the winner, loser, book-to-market, size and long-term winner and loser portfolios. The type II strategy invests in the risky asset if the previous month's return on the CRSP Value Weighted index was greater than 2% and in 1 month T bills otherwise. Downside volatility is the annualized standard deviation of the negative returns on a portfolio or strategy. The strategies are considered over the 1975-2006 period. Bonferroni *p*-value is for a joint test across portfolios of the same sorts of the null hypothesis that the average return of the strategies is zero. It is computed as the *p*-value of the individual test multiplied by the potential number of portfolios tested.

Portfolio	Average Return	*p*-value	Bonferroni *p*-value	Sharpe Ratio	Volatility	Downside Volatility
Winner decile	16.98%	4.36×10^{-14}	0.000	0.87	12.11%	5.61%
Winner third	17.06%	1.46×10^{-9}	0.000	1.10	9.60%	3.61%
Loser decile	9.33%	4.00×10^{-4}	0.004	0.19	14.81%	8.23%
Loser third	14.41%	7.85×10^{-5}	0.000	0.71	11.18%	4.35%
High B/M decile	15.00%	8.51×10^{-18}	0.000	0.91	9.36%	3.70%
High B/M third	13.17%	2.07×10^{-19}	0.000	0.86	7.79%	3.43%
Small Size decile	18.66%	1.02×10^{-16}	0.000	1.01	12.09%	5.33%
Small Size third	17.30%	1.03×10^{-16}	0.000	0.97	11.19%	5.03%
Long-Term Winner decile	12.15%	5.56×10^{-8}	0.000	0.47	12.59%	6.91%
Long-Term Loser decile	16.65%	2.64×10^{-11}	0.000	0.73	13.36%	5.33%

Table IV

Percentage of Up and Down Extreme Moves

This table shows the ratios of extreme up and down moves of each timing strategy relative to the underlying portfolio. An extreme up move is a monthly return of more than 5% while an extreme down move refers to a monthly return of less than -5%. The timing strategies are the type I and type II timing strategies based on the winner, loser, book-to-market, size and long term winner and loser portfolios. The type I strategy invests in the risky asset if the previous month's return on the CRSP Value Weighted index was positive and in 1 month T bills otherwise while the type II strategy invests in the risky asset if the previous month's return on the CRSP Value Weighted index was greater than 2% and in 1 month T bills otherwise. The strategies are considered over the 1975-2006 period.

Portfolio	Extreme Up Ratio		Extreme Down Ratio	
	Type I	Type II	Type I	Type II
Winner decile	0.57	0.43	0.56	0.25
Winner third	0.57	0.41	0.52	0.17
Loser decile	0.72	0.47	0.52	0.31
Loser third	0.73	0.44	0.47	0.26
High B/M decile	0.66	0.37	0.38	0.10
High B/M third	0.60	0.42	0.40	0.10
Small Size decile	0.79	0.57	0.48	0.21
Small Size third	0.72	0.52	0.48	0.23
Long-Term Winner decile	0.58	0.43	0.52	0.29
Long-Term Loser decile	0.66	0.52	0.55	0.33

Table V

Risk Adjusted Performance of the Primitive Portfolios

This table shows the annualized alpha together with its *p*-value in parentheses and the time-series regression coefficient of determination relative to the appropriate factor model for the winner, loser, book-to-market, size and long term winner and loser portfolios. The strategies are considered over the 1975-2006 period. The winner and loser portfolios as well as the long term winner and loser portfolios are evaluated using the *MKT*, *SMB*, *HML* and the *UMD* factors. The book-to-market portfolios are evaluated using the *MKT*, *SMB* and the *HML* factors. The size portfolios are evaluated using the *MKT* and the *SMB* factors.

Portfolio	*Alpha*	Adj. R^2
Winner decile	-1.67% (0.150)	0.924
Winner third	13.81% (0.000)	0.547
Loser decile	-3.34% (0.028)	0.899
Loser third	5.14% (0.014)	0.660
High B/M decile	0.17% (0.906)	0.796
High B/M third	0.28% (0.740)	0.900
Small Size decile	0.22% (0.868)	0.877
Small Size third	-0.52% (0.454)	0.963
Long-Term Winner decile	-0. 31% (0.811)	0.881
Long-Term Loser decile	-0.24% (0.905)	0.765

Table VI

Unconditional Risk Adjusted Performance of the Type I Timing Strategies

This table shows the annualized alpha with its *p*-value in parentheses and the time-series regression Adj. R^2 relative to the appropriate factor model for the type I timing strategies based on the winner, loser, book-to-market, size and long-term winner and loser portfolios. The strategies are considered over the 1975-2006 period. The timing strategies based on the winner and loser portfolios as well as the long-term winner and loser portfolios are evaluated using the *MKT*, *SMB*, *HML* and the *UMD* factors with and without an upside factor (*UP*). The upside factor is the maximum of the return on the CRSP Value Weighted index and zero. The timing strategies based on the book-to-market portfolios are evaluated using the *MKT*, *SMB* and the *HML* factors. The timing strategies based on the size portfolios are evaluated using the *MKT* and the *SMB* factors. The asterisks of * and ** denote, respectively, the significance at the 5% and 1% levels of an *F*-test of whether the inclusion of the *Up* factor to the corresponding factor model provides incremental explanatory power.

	Without the *Up* Factor		With the *Up* Factor	
Portfolio	*Alpha*	Adj. R^2	*Alpha*	Adj. R^2
Winner decile	2.31%	0.415	-3.83%	0.422*
	(0.300)		(0.281)	
Winner third	8.97%	0.297	-2.29%	0.335**
	(0.000)		(0.448)	
Loser decile	4.56%	0.526	-5.57%	0.538*
	(0.067)		(0.156)	
Loser third	7.91%	0.346	-8.75%	0.409**
	(0.000)		(0.008)	
High B/M decile	4.42%	0.402	0.92%	0.404
	(0.014)		(0.745)	
High B/M third	2.45%	0.439	-1.36%	0.445*
	(0.078)		(0.539)	
Small Size decile	7.74%	0.402	2.28%	0.450*
	(0.000)		(0.859)	
Small Size third	5.92%	0.484	-0.88%	0.493**
	(0.001)		(0.435)	
Long-Term Winner decile	2.74%	0.419	-4.23%	0.428*
	(0.216)		(0.231)	
Long-Term Loser decile	5.76%	0.364	-4.70%	0.382**
	(0.018*)		(0.219)	

Table VII

Unconditional Risk Adjusted Performance of the Type II Timing Strategies

This table shows the annualized alpha with its *p*-value in parentheses and the time-series regression Adj. R^2 relative to the appropriate factor model for the type II timing strategies based on the winner, loser, book-to-market, size and long-term winner and loser portfolios. The strategies are considered over the 1975-2006 period. The timing strategies based on the winner and loser portfolios as well as the long-term winner and loser portfolios are evaluated using the *MKT*, *SMB*, *HML* and the *UMD* factors with and without an upside factor (*UP*). The upside factor is the maximum of the return on the CRSP Value Weighted index and zero. The timing strategies based on the book-to-market portfolios are evaluated using the *MKT*, *SMB* and the *HML* factors. The timing strategies based on the size portfolios are evaluated using the *MKT* and the *SMB* factors. The asterisks of * and ** denote, respectively, the significance at the 5% and 1% levels of an *F*-test of whether the inclusion of the *Up* factor to the corresponding factor model provides incremental explanatory power.

	Without the *Up* Factor		With the *Up* Factor	
Portfolio	*Alpha*	Adj. R^2	*Alpha*	Adj. R^2
Winner decile	7.53%	0.265	-0.16%	0.281*
	(0.000)		(0.959)	
Winner third	8.20%	0.242	-0.47%	0.278**
	(0.000)		(0.856)	
Loser decile	4.56%	0.337	-6.30%	0.361**
	(0.049)		(0.082)	
Loser third	7.46%	0.198	-5.96%	0.263**
	(0.000)		(0.044)	
High B/M decile	5.01%	0.204	-1.77%	0.229**
	(0.001)		(0.460)	
High B/M third	3.63%	0.246	-2.53%	0.276**
	(0.003)		(0.191)	
Small Size decile	8.79%	0.277	1.36%	0.295**
	(0.000)		(0.639)	
Small Size third	7.39%	0.299	-1.14%	0.327**
	(0.000)		(0.661)	
Long-Term Winner decile	5.79%	0.296	-2.21%	0.312**
	(0.004)		(0.491)	
Long-Term Loser decile	8.00%	0.224	-4.09%	0.260**
	(0.000)		(0.247)	

Table VIII

Conditional Risk Adjusted Performance of the Type I Timing Strategies

This table shows the annualized alpha together with its *p*-value in parentheses and the time-series regression coefficient of determination relative to the appropriate factor model for the type I timing strategies based on the winner, loser, book-to-market, size and long term winner and loser portfolios. The strategies are considered over the 1975-2006 period. The timing strategies based on the winner and loser portfolios as well as the long term winner and loser portfolios are evaluated using the *MKT*, *SMB*, *HML* and the *UMD* factors. The timing strategies based on the book-to-market portfolios are evaluated using the *MKT*, *SMB* and the *HML* factors. The timing strategies based on the size portfolios are evaluated using the *MKT* and the *SMB* factors.

	Macro Instruments		The *Up* Dummy	
Portfolio	*Alpha*	Adj. R^2	*Alpha*	Adj. R^2
Winner decile	2.65%	0.429	-1.82%	0.680
	(0.255)		(0.285)	
Winner third	9.28%	0.321	5.41%	0.542
	(0.000)		(0.001)	
Loser decile	5.48%	0.540	0.37%	0.742
	(0.038)		(0.845)	
Loser third	9.08%	0.393	4.62%	0.490
	(0.000)		(0.020)	
High B/M decile	4.36%	0.426	1.39%	0.573
	(0.027)		(0.368)	
High B/M third	2.07%	0.467	0.30%	0.659
	(0.1740)		(0.789)	
Small Size decile	8.46%	0.458	1.98%	0.704
	(0.000)		(0.190)	
Small Size third	6.88%	0.500	0.71%	0.750
	(0.001)		(0.590)	
Long-Term Winner decile	3.65%	0.444	-0.09%	0.647
	(0.117)		(0.958)	
Long-Term Loser decile	5.54%	0.386	-0.44%	0.608
	(0.032)		(0.821)	

Table IX

Conditional Risk Adjusted Performance of the Type II Timing Strategies

This table shows the annualized alpha together with its *p*-value in parentheses and the time-series regression coefficient of determination relative to the appropriate factor model for the type II timing strategies based on the winner, loser, book-to-market, size and long term winner and loser portfolios. The strategies are considered over the 1975-2006 period. The timing strategies based on the winner and loser portfolios as well as the long term winner and loser portfolios are evaluated using the *MKT*, *SMB*, *HML* and the *UMD* factors. The timing strategies based on the book-to-market portfolios are evaluated using the *MKT*, *SMB* and the *HML* factors. The timing strategies based on the size portfolios are evaluated using the *MKT* and the *SMB* factors.

	Macro Instruments		The *Up* Dummy	
Portfolio	*Alpha*	Adj. R^2	*Alpha*	Adj. R^2
Winner decile	7.30%	0.275	3.71%	0.610
	(0.001)		(0.013)	
Winner third	8.36%	0.254	4.92%	0.560
	(0.000)		(0.000)	
Loser decile	5.08%	0.349	0.41%	0.640
	(0.040)		(0.817)	
Loser third	8.10%	0.235	4.04%	0.408
	(0.000)		(0.018)	
High B/M decile	4.93%	0.224	1.86%	0.493
	(0.004)		(0.136)	
High B/M third	3.88%	0.255	1.43%	0.578
	(0.005)		(0.130)	
Small Size decile	10.13%	0.295	3.24%	0.642
	(0.000)		(0.015)	
Small Size third	9.05%	0.319	2.41%	0.680
	(0.000)		(0.039)	
Long-Term Winner decile	5.86%	0.302	3.16%	0.572
	(0.007)		(0.052)	
Long-Term Loser decile	7.49%	0.255	2.03%	0.529
	(0.002)		(0.263)	