Estimating Expected Returns in an Event Study Framework: Evidence from the Dartboard Column

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This paper examines methodological issues surrounding estimation of abnormal returns in an event study framework. We study a bias in estimating expected returns when applying the market model to study samples that include momentum securities. Based on this bias, an alternative method for estimating expected return is recommended. Numerous event studies have examined the performance of stocks recommended by investment professionals. We argue that these recommendations have a tendency to involve momentum securities. To examine these issues we study recommendations made in the well-known Wall Street Journal Dartboard contest. We find that these securities are indeed momentum securities and that application of the market model provides biased results.

Introduction

Event study methodology seeks to measure the return impact on securities experiencing a microeconomic event such as a recommendation by a security analyst or a macroeconomic event such as a shift in monetary policy. Since the seminal work of Fama, Fisher, Jensen and Roll (1969), standard event study methodology determines a security's price reaction by comparing actual returns to estimated expected returns. To find the estimated return, the historic relationship between the security and the market is determined by regressing the security return against the market return. The resulting estimated regression parameters represent the responsiveness of the security to changes in the market return, beta, and the level of abnormal returns

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for the security, alpha. During the event window these parameters are applied to the market return to determine the expected return for a particular security.

As described by Binder (1998) in his comprehensive review of event study methodology, the market model method assumes that the average abnormal return for the sample as measured by the average alpha value should be zero. There may be events, however, where this assumption does not apply. A large body of literature (see for examples Hong, Lim, and Stein, 2000; Rouwehhorst, 1998; and Chan, Jegadeesh, and Lakonishok, 1996) shows that over medium-term horizons groups of securities display positive momentum, a tendency for securities to outperform the market over an extended period.[1] For a sample of momentum securities the average alpha value determined by the market model would be positive. If an event applies predominately to momentum securities, use of the market model to measure the impact of the event will result in biased estimates.

Stickel (1985) suggests that professional investment analysts tend to recommend "hot stocks," that is, securities that have recently displayed positive momentum. If Stickel's presumption is correct, market model event studies of the performance of securities recommended by professional analysts will provide biased conclusions. In this paper we propose an alternative estimation procedure for estimating the expected security return. This straightforward procedure is based on standard modeling assumptions but may result in radically different conclusions for securities exhibiting positive price momentum. We apply this procedure to the literature concerning the performance of securities selected by investment professionals participating in the *Wall Street Journal*'s Dartboard column. We replicate the work of Liang (1999) and show that our alternative estimation procedure results in a dramatically different conclusion from that reached by Liang using standard event study methodology.

In the next section we identify the probable direction of bias from applying the market model to momentum securities and suggest a straightforward correction to this potential bias. In the third section we provide a brief description of the Dartboard contest and a summary of the conclusions of the various empirical studies examining the performance of investment professionals participating in this contest. The fourth section describes our sample and methodology. The fifth section reports empirical results and is followed by concluding remarks.

Market Model Bias

Application of standard market model event study methodology to a sample of momentum securities results in biased estimates of expected returns and hence

[1] In contrast, the overreaction literature (DeBondt and Thaler, 1987) finds that for longer periods momentum reverses. Winners become losers and losers become winners.

biased estimates of abnormal returns. Such studies generally use a pre-selection sample to estimate equation (1):

$$R_{it} = a_i + b_i * R_{mt} \quad (1)$$

where R_{it} represents the return to security i on day t; R_{mt} represents the return to the market on day t; and a_i and b_i are the OLS parameter estimates relating the security return to market return. Abnormal returns are then calculated as shown in equation (2):

$$AR_{it} = R_{it} - (a_i + b_i * R_{mt}) \quad (2)$$

where AR_{it} represents the abnormal return to security i on day t and the rest of the terms in the equation are as defined above. One of the inherent flaws in this methodology is that it is subject to the nonstationarity of the OLS parameter estimates as identified by Hays and Upton (1986). Although considerable research has focused on errors introduced by shifts in beta (Binder, 1998), little attention has been given to errors introduced by alpha bias.[2] As argued above, when event studies apply the market model to momentum securities, seriously bias is likely to result from positive average alphas.

When the market model parameters are estimated, as described in equation (1), using pre-selection data for momentum stocks, the alpha estimate is upwardly biased as these stocks receive returns higher than justified by beta risk. Thus, calculation of abnormal returns as shown in equation (2) results in a downward bias in the period following the announcement. This bias should have little impact on the observation of the single announcement day return, but the cumulative effect on abnormal returns may become significant.

In this paper we advocate an alternative methodology for estimating abnormal returns that avoids the potential bias for momentum securities from the estimate of the intercept parameter generated by the market model. This model provides investigators with an additional tool for confirming the inferences being made from event study results. The possibility of bias in the alpha estimates is avoided by estimating abnormal returns as suggested by Jensen (1968). These abnormal returns are estimated using equation (3).

$$AR_{it} = R_{it} - (R_{ft} + \beta_i * (R_{mt} - R_{ft})) \quad (3)$$

where R_{ft} represents the daily return to the risk-free security; R_{mt} measures the market return; and R_{it} represents the daily return for the security being studied. β_i represents the beta calculated by the market model or other means, and AR_{it} is the daily abnormal return for the selected security.

Equation (3) uses the capital asset pricing model (CAPM) as the theoretical construct for estimating expected returns. As a result, the estimates of the abnormal

[2] Jones (1993) identifies methodological problems with the contrarian investor studies and proposes a beta-adjusting procedure to adjust for these biases. He finds significantly positive contrarian alphas.

returns generated by the difference between the actual returns and the expected returns from the CAPM are not subject to the bias found in the intercept parameter estimate. The bias is eliminated because the intercept term generated in estimating beta is not used to estimate the expected return. Thus, a simple procedural change eliminates a potentially significant sample bias. To test the results of this change we apply the methodology to a sample of securities selected in the well-known *Wall Street Journal* Dartboard column and compare results using this methodology with results using the standard market model event study methodology.

Event Studies of the Dartboard Selections

The Dartboard Column

The *Wall Street Journal's* Dartboard column provides an environment for testing the price impact of the recommendations of investment professionals. The contest, which began in October 1988, was purposefully designed as a non-academic test of Malkiel's (1973) suggestion that the net returns of securities selected by throwing darts at the financial pages should perform about as well as securities selected by investment professionals. The contest format involves comparing the average performance of four investment professionals, each of whom recommends a single security, against the average return of four securities selected by *Journal* staff members throwing darts at the financial pages.[3] In addition, the average return of the securities selected by the pros is compared to the return of the DJIA. The original contest format involving a one-month return period was extended to a six-month period with the January 1990 contest, so that the holding period results would be less likely to be biased from the price pressure resulting from the initial announcement. Both the *Wall Street Journal* and academic observers have studied the results of this contest and made pronouncements on market efficiency.

The *Wall Street Journal* announced the end of the contests in the April 2002 column. (The result of this final contest was reported in the September 2002 edition.) As of April 2002, the pros had been victorious in 61.27 percent of the contests against the darts. Although the *Journal* does not report statistical comparisons (and presumably does not conduct such tests), using a binomial distribution it may be shown that the winning margin of the pros is greater than expected at random with a level of significance of 1 percent.[4] The *Journal* also reports average return over the length of the contests. As of April 2002, the average six-month return for the selections of the pros was nearly three times the average six-month return for the securities selected by the darts (10.2 percent versus 3.5 percent).

[3] In the last several years of the contest, randomly selected picks from the *Wall Street Journal* readers also were included in the contest.

[4] This level of significance results from a one-tail binomial test where $\pi = 0.5$, $n = 168$, $p = 0.6127$, $\sigma_p = 0.0376$, resulting in a z-value of 3.00.

Academic Studies

Several academic studies have made comparisons similar to those done by the *Journal* but have done so, appropriately, by making comparisons using risk-adjusted returns. As we argue above, however, applications of the market model to estimate expected returns likely will provide biased results by overestimating the alpha parameter for momentum securities. Indeed, understanding the existence of this bias is crucial for correctly interpreting the impact of the expert recommendations in an event study framework using an extended time period for an event window.

The academic studies find an immediate and significantly positive impact on the price of the security selected by the investment professionals. All the studies find an average abnormal return of about 4 percent for the selected securities over the two-day trading period including the announcement day and the following trading day. An alpha bias from the market model should have little impact on the results from a two-day event window, but the cumulative effect on abnormal returns over an extended period may become significant. In the case of the Dartboard column, the existence of this bias is crucial for explaining the varying interpretations of previous studies related to the announcement period increase and subsequent price behavior of the selected securities.

Within this set of studies, two hypotheses have emerged to explain the price increases that occur at the announcement date. The first hypothesis revolves around an information effect. This hypothesis states that there is significant information provided in the expert picks that removes a portion of the asymmetric information in the market, thus providing investors with valuable information that results in permanent price changes.[5] The second hypothesis argues that announcement day effects are transitory and caused by herd behavior of uninformed investors who overestimate the importance of recommendations made by the pros and underestimate the price efficiency of the market.

Barber and Loeffler (1993) were the first to apply event study methodology to analyze market implications provided by performance of securities selected in the

[5] The *Wall Street Journal* devotes limited space to the explanation provided by the investment professionals concerning the rationale for their picks. Thus, the information released on the individual stocks is limited. A cursory reading of these recommendations quickly reveals that the price increase could not be based on the limited information directly provided about the prospects of the selected company. One must conclude that any information effect must result from conclusions by readers that the selection itself is important market information. Analysts gain important exposure from the Dartboard column, favorable exposure if their prediction results in success. Hence, the experts have an incentive to reveal any superior information that they might have with this pick. Investors following this line of reasoning may buy the stock not based on the immediate information about the company, but because an expert is staking his/her reputation on the selection. This interpretation is consistent with the findings of Wright (1994), Albert and Smaby (1996), and Liang (1999) that the size of the price increase at the announcement is associated with the reputation of the investment professional.

Dartboard contest. Their sample includes selections from the first two years of the contest, providing a mixture of one-month and six-month contest periods. They used the market model to determine abnormal returns and estimated the parameters of the market model over a 100-day period that ends 26 days before the announcement. The use of this time period would result in biased estimates of alpha if the Dartboard professionals were recommending momentum securities.

For their sample of 95 securities Barber and Loeffler find significant average abnormal returns on the announcement day of 3.53 percent. They monitor the performance in a 25-day post performance sample and find that about half of the initial price increase is reversed. Based on this partial reversal, they conclude that a portion of the initial price increase results from price pressure from uninformed investors. This conclusion is supported by the tendency for the securities experiencing the highest initial price increases to experience the highest reversals. Because about half the initial price increase remained, however, Barber and Loeffler suggest that the selection announcement contains important information.

Wright (1994), Metcalf and Malkiel (1994), and Liang (1999) question the existence of an information effect from the announcement made in the Dartboard column and suggest that investors would lose if they selected securities recommended by the pros in the Dartboard column. Wright (1994) examines the 20 one-month contests[6] that began the Dartboard column. Unlike Barber and Loeffler (1993), Wright does not directly estimate the market model. Rather, Wright collects betas from quarterly editions of O'Neil's Database and determines abnormal returns in a manner similar to that which we suggest above using equation (3). Wright determines cumulative abnormal returns for the announcement day and the 40-day period following the announcement. He finds an average abnormal return of 4.49 percent for the announcement day return and the following trading day. He determines, however, that this effect is almost entirely reversed over the next 39 trading days. Wright concludes that the evidence indicates a market inefficiency whereby prices are temporarily, unduly influenced by the opinion of a "so-called expert."

Metcalf and Malkiel (1994) reach similar conclusions in a study of the first 30 six-month contests. They estimate the market model[7] for the one-year trading period before the contest and the six-month contest period. They find that recommended stocks are riskier than the market as a whole, but that over the entire period alphas were significantly greater than zero. By applying betas calculated over the entire one and one-half year period including the six-month contest period, however, they find

[6] The six-month contests begin with the January 1990 contest, but to provide continuous results the *Wall Street Journal* conducted simultaneous one-month and six-month contests for the selections made January 1990 through June 1990. Wright includes the one-month contests occurring in 1990 as part of his sample.

[7] Metcalf and Malkiel (1994) use excess returns in their regression estimates instead of raw returns, as is normal in the application of the market model.

that average alpha parameters are not significantly different from zero. Further, they find that investors purchasing recommended securities at the close of the announcement day would have a lower return than what would be earned by the securities selected by the darts. Thus, Metcalf and Malkiel also dispute the contention by Barber and Loeffler that the recommendations contain an information effect.

Liang (1999) provides results more directly comparable to Barber and Loeffler. Liang uses the same 100-day period to calculate the market model estimates and calculates abnormal returns in the same fashion by subtracting expected returns generated using the market model parameter estimates from actual returns. Liang, however, uses a larger sample size of 216 observations (that include only 6-month samples rather than the mixture of one-month and six-month samples used by Barber and Loeffler) and determines abnormal returns for a 125-day post-selection period rather than the 25-day period used by Barber and Loeffler. Liang finds a similar highly significant announcement day return of 2.84 percent. Over a 25-day post announcement period, cumulative abnormal returns were partially reversed as found by Barber and Loeffler. When the post sample period is extended to 125 days, however, cumulative abnormal returns become negative. Over the six-month contest period, investors would lose 3.8 percent on a risk-adjusted basis even if they had been able to buy at market close the day before the contest. Thus, Liang concludes that price increases surrounding announcements are due to price pressure rather than information content.

Liang supports this conclusion with two additional findings. First, he documents unusual volume activity on the announcement date. Second, the positive announcement effect is stronger for repeating pros, suggesting that naïve investors react more strongly to pros that have an enhanced reputation based on recent success. Pruitt, Van Ness, and Van Ness (2000) provide additional evidence in favor of a price pressure impact. They test for a clientele effect in trading behavior after the recommendation announcement. They find that smaller investors are more likely to make trades both on the announcement date and in the days that follow than larger investors, suggesting that price increases result from buying by naïve investors.

The difference in results from Barber and Loeffler and Liang are consistent with the estimation bias that forms the basis of this paper. As argued above, market model estimates made for momentum securities upwardly bias estimates of alpha, resulting in estimates of abnormal returns that are biased downward. The effect of this bias on estimating abnormal returns on a single day would likely be minimal. This bias becomes more serious, however, when cumulating abnormal returns over a longer time period. Hence, Liang's extension of the event window from 25 days to 125 days would be expected to produce much lower cumulative abnormal returns.

In contrast to other post-Barber and Loeffler studies, Albert and Smaby (1996) find support for the information hypothesis. Albert and Smaby recognize the potential bias in using the market model to estimate abnormal returns for momentum

securities. They use a sample of 140 Dartboard securities involving observations from both the one-month and six-month contests. They study cumulative returns over the period 25 trading days before the selection announcement through 50 trading days following the announcement. They estimate parameters for the market model using two estimation periods. Following Barber and Loeffler, they estimate the market model for 100 trading days before their event window. Because they recognize the likely bias in the use of this estimation period, however, they also estimate the market model using the 100 trading days following the event window. They estimate abnormal returns with both the pre-selection and the post-selection market model estimates.

Albert and Smaby find average abnormal returns of approximately 4 percent for the two-day period including the announcement day and the following trading day using either the pre-selection or post-selection estimates. There is, however, a substantial difference in the estimated cumulative abnormal returns for the 51-day trading period beginning with the announcement day. Using the pre-selection estimates of the market model, a complete reversal of the positive effect from trading days 0 through 1 is observed. In contrast, when abnormal returns are determined using the post-selection estimation of the market model, no reversal is observed through trading day 25 and only a partial reversal (approximately half) is observed through day 50. These results are confirmed by the use of size-adjusted returns. Albert and Smaby conclude that their results are consistent with an information effect.

Albert and Smaby's use of the post-selection market model estimate avoids a bias from the use of inflated alpha values generated using pre-selection estimates of the market model. The adjustment, however, is *ad hoc*. On an *a priori* basis how should a researcher determine whether to use a pre-selection sample or a post-selection sample to estimate the market model? On what basis can one be assured that similar errors would not be made using the post-selection sample? In fact, the work of DeBondt and Thaler (1987) suggests that such a problem may be likely. They document that winners (momentum securities) become losers and *vice versa.* Given this tendency for price reversal, the alpha parameter in the post-selection period may be downwardly biased, resulting in an upward bias in the estimate of abnormal returns. This bias might lead investigators to falsely conclude an information effect exists. The *ad hoc* nature of using the market model estimates from the post-selection sample may explain why in recent studies such as Liang (1999), abnormal returns are still estimated using a pre-selection sample to estimate the market model.

In this paper we provide an alternative methodology for estimating abnormal returns that avoids the potential bias in the estimate of the intercept parameter generated by the market model whether these estimates result from a pre-selection or a post-selection sample. We demonstrate that the choice of methodology is critical when performing event studies that have extended event windows by comparing our

results to those reported by Liang (1999). We incidentally provide additional insight relative to the value of recommendations such as those reported in the Dartboard column.

Data and Methodology

This study uses expert selections from the January 1990 contest (the first six-month contest) through the December 1999 contest, comprising 480 total selections. Security returns were obtained from the CRSP U.S. Stock Database. This database provides return data for 446 of the securities in the total sample.[8] Thus we test a much larger sample size than used in any previous study of the Dartboard column predictions, and we avoid mixing results from one-month and six-month contests.

Following Albert and Smaby (1996), we estimate the market model for both pre-selection and post-selection samples. Following Liang (1999), in both cases a 100-day period is used to estimate the regression parameters. The post-selection estimation period begins on the 126th trading day following the announcement. The pre-selection estimation period ends on the 26th trading day prior to the announcement. Data permit the calculation of this regression for 441 securities using pre-selection data and for 446 securities using post selection data.

To test for the tendency of investment professionals to recommend momentum securities, we examine the average value of the intercept parameter estimates calculated in the pre-selection period sample. Use of the market model predicts an average alpha value of zero under random selection; hence, we test the null hypothesis that the average alpha value is zero against the alternative hypothesis that the average alpha value is greater than zero. We also examine the average alpha value in the post-selection period to test for price reversal pressure. In addition, we conduct a paired t-test of the alphas calculated in both periods. For methodological inference we conduct similar tests comparing the beta estimates for the two samples.

Unlike previous studies, we estimate abnormal returns with equation (3) (repeated here for ease of reference).

$$AR_{it} = R_{it} - (R_{ft} + \beta_i * (R_{mt} - R_{ft})) \quad (3)$$

where:

R_{ft} = The daily return to the risk-free security, which is measured as the daily equivalent of the annualized three-month Treasury bill collected from the St. Louis Fed's FRED database; the market return is measured by the CRSP value-weighted NYSE/AMEX/Nasdaq index return;

R_{it} = The daily return for the security recommended by the investment professionals;

βi = The beta calculated by the market model; and

AR_{it} = The daily abnormal return for the selected security.

[8] Primarily, the missing securities resulted from selections of warrants and foreign securities.

If the experts recommend a short sell, abnormal returns are determined by reversing the sign of the value determined by equation (3).

Abnormal returns generated using equation (3) use CAPM as the theoretical construct for estimating expected returns. This method eliminates the possibility of bias in the alpha estimates in either the pre-selection or the post-selection period. As a result, the estimates of the abnormal returns generated by the difference between the actual returns and the expected returns from the CAPM are not subject to the bias found in the intercept parameter estimate when using either the pre or post selection estimation period. This bias is eliminated simply because the intercept is not used in generating the expected return estimates.

To identify the impact of the market recommendation we test the null hypothesis that cumulative average abnormal returns are zero over several different periods. We test for an announcement effect by examining abnormal returns for the announcement day and several short-term periods around the announcement day. We test for longer-term effects, in part to distinguish between the price pressure and information effects, with tests over various periods from the announcement day through day +125. In addition, we test for momentum prior to the selection announcement by observing abnormal returns over the 25-day period prior to announcement. In all of these tests we assume that the sampling distribution for abnormal returns is distributed $N(\text{sample mean}, s/\sqrt{n})$.

Empirical Results

Tests of Market Model Parameters

The first empirical issue is to test for the existence of momentum investing by examining the alpha parameter of the market model estimate in the pre- and post-selection periods. For the pre-selection sample, a significantly positive alpha would indicate that the Dartboard pros are selecting securities with a past history of positive momentum. While for the post-selection sample, a significantly negative alpha would indicate a price reversal following the announcement. Each sample is tested assuming a hypothesized value for alpha of zero.

The results in Table 1 provide clear evidence of the existence of momentum advising on the part of the Dartboard professionals. In the 100-day pre-selection esti-

Table 1—Mean Alpha Values

	Pre-Selection Sample	Post-Selection Sample
Mean	0.04	-0.02
(t-stat.)	(2.955)	(-1.447)
[p-value]	[0.0016]	[0.0743]
Sample Size	441	446

Note: The t-statistics result from a standard one-population test of the mean. The p-values assume a one-tail test. Mean alpha values are reported as percentages

mation period, the average value for the market model alpha is 0.04 percent. We reject the hypothesis that the average value for the alpha parameter is zero at a p-value of 0.0016. The price momentum argument of Stickel (1985) holds for this sample.

Table 1 also provides evidence of the existence of price reversals in the post-selection estimation period. The average post-selection alpha value of –0.02 percent is significantly less than zero with a p-value of 0.0743. Such a reversal may be due to the market's response to over-exuberant announcement day returns, or due to price momentum that had existed prior to the announcement date, or due to a combination of the two.

The results reported in Table 1 support Albert and Smaby's (1996) contention that the use of the pre-selection sample to determine the market model parameters would create biased estimates. There is also evidence that use of the post-selection sample provides bias in the opposite direction. Presumably, additional bias may exist in the betas calculated in the pre-selection and the post-selection sample periods. To test for this possibility and to test the bias in alpha directly, we use a matched pair, two-population t-test to compare the differences between the alpha and beta estimates in the pre-selection and post-selection sample periods. The results of these tests, which are reported in Table 2, indicate that abnormal return calculations are affected by the sample selection period from which alpha is derived, as a significant difference exists between the pre- and post-selection alphas. The average beta in the pre-selection and post-selection sample periods appears to be stable, however, as there is no significant difference in the average beta calculated from the two sample periods. The instability of the alpha parameter estimate provides an argument for using equation (3) to determine abnormal returns, because it allows for the generation of abnormal returns without using an alpha estimate from the market model.

Table 2—Comparison of Alpha and Beta Values Between Pre- and Post-Selection Periods

	Alpha	Beta
Mean	0.065	0.0074
(t-stat.)	(3.35)	(0.18)
[p-value]	[0.0009]	[0.8595]
N	433	433

Note: The t-statistics result from a matched pair, two-population test of the difference of the means. The p-values assume a two-tail test. Mean values result from subtracting post-selection values from pre-selection values. Mean alpha differences are reported as percentages

Abnormal Returns

We report various comparisons of abnormal returns calculated both by using the market model containing the pre-selection alpha and by the alternative model defined in equation (3). For the sake of comparison, we use the pre-selection period sample to estimate the beta parameter for equation (3). Although we restrict our reported results to those using the pre-selection period sample, the use of a post-

selection sample results in nearly identical outcomes. It should be emphasized that our comparisons seek to illustrate the potential bias from using the alpha values calculated by the market model. This bias is avoided by using equation (3) rather than equation (2) to calculate abnormal returns.

Table 3 reports comparisons of cumulative average abnormal returns for various time periods around the publication date of the Dartboard column as calculated by equation (3) and the market model. Consistent with previous studies, both methods indicate a significant announcement day effect resulting in an average abnormal announcement day return of almost 3 percent. Clearly, the market quickly reassesses the value of the securities recommended by the Dartboard experts. This reevaluation process continues through the following trading day, and the two-day cumulative abnormal return is over 3.5 percent. The hypothesis of no announcement day effect can be rejected at any level of significance. Other short event windows report significant abnormal returns including positive abnormal returns just prior to the

Table 3—Comparison of Cumulative Abnormal Returns Using Market Model Assumptions and Equation (3) to Generate Abnormal Returns

Time Period	Cumulative Abnormal Returns Using Market Model	Cumulative Abnormal Returns Using Equation (3)
Day –25 to 125	-0.72	3.74
	(-0.52)	(3.07)
	[0.3017]	[0.0011]
Day –5 to 5	4.48	4.56
	(8.96)	(9.72)
	[0.0000]	[0.0000]
Day –1 to 1	3.88	3.75
	(14.75)	(14.48)
	[0.0000]	[0.0000]
Day 0	2.89	2.77
	(18.37)	(17.62)
	[0.0000]	[0.0000]
Day 0-1	3.56	3.45
	(16.65)	(16.32)
	[0.0000]	[0.0000]
Day 0-125	-2.15	1.74
	(-1.11)	(1.96)
	[0.1338]	[0.0254]
Day 1-125	-5.05	-1.03
	(-2.22)	(-0.39)
	[0.0135]	[0.3487]
Day 2-125	-5.72	-1.71
	(-2.55)	(-0.10)
	[0.0056]	[0.5395]

Note: Cumulative abnormal return results (reported as percentages) are generated from abnormal returns calculated both by using the market model assumptions of Liang (1999) and by using equation (3) in this paper. The t-statistic results are from testing the null hypothesis of mean = 0 and the p-values assume a one-tail test. The alternative hypothesis assumes a positive value except examining cumulative abnormal returns for days 2 through days 125 for price reversal

announcement. Bias in the market model does not manifest itself over these short event windows.

Comparisons of abnormal returns over longer event windows provide substantially different results. The event window ranging from day 0 through day 125 can be interpreted to show the long-term market impact from the announcement. The use of the market model indicates a negative average cumulative abnormal return of less than -2 percent. This result is consistent with the findings of Metcalf and Malkiel (1994), Wright (1994), and Liang (1999), all of whom find a negative average cumulative abnormal return from the announcement date through the end of their sample period. Thus, they attribute the significant announcement day effect to a publication effect resulting in a price increase without any apparent information content.

Using equation (3) to calculate abnormal returns results in a positive cumulative average abnormal return of 1.74 percent between day 0 and day 125. This cumulative average abnormal return, however, is approximately half of the value of the cumulative average abnormal return for the announcement day and the following trading day. These results are closest to Barber and Loeffler (1993) who use a much smaller event window.[9] They argue that part of the price increase at the announcement is caused by the herd mentality of uninformed investors, but that the rest of the price increase results from the information content of the announcement. Albert and Smaby (1996) find no significant reversal in cumulative average abnormal returns from the announcement period until the end of their 50-day event window. This result is to be expected, as they use the market model with post-selection alphas. As reported above, post-selection alphas are generally negative. Use of these alphas would bias expected returns downward and abnormal returns upward.

The results of this paper provide evidence that these varying interpretations primarily result from using different methodologies to calculate abnormal returns for long event period windows. Our results differ from Liang (1999), who ignores the bias in the market model using pre-selection alphas as suggested by Albert and Smaby (1996). Our results also differ from Albert and Smaby, who introduce a bias in the opposite direction using post-selection alphas. The results we report are most similar to Barber and Loeffler (1993) whose use of a small event window does not allow the market model bias to completely erode the large announcement day returns. They conclude that price pressure from the announcement caused part of the increase on the announcement day and that the market in part corrected for this exu-

[9] Barber and Loeffler (1993) use a relatively small 25-day post-announcement event window. As shown in Table 5, the results from using a market model over this period would show a significantly positive return. Hence, the primary difference in the conclusions of Barber and Loeffler and the conclusions of Liang (1999), both of which use the same market model methodology, is the length of the event window.

berance in the month following the announcement. The lack of full reversal, however, indicates the existence of some information effect.

The information effect interpretation of the announcement day price increase is of interest to researchers in both behavioral finance and signaling theory. A cursory review of the Dartboard column commentary indicates that the only new information that is released is that a single investment professional has put his or her reputation on the line to recommend a single stock. For an information effect to exist in this case, there must be a significant number of market participants that believe that the investment professional has access to superior information that is acquired after paying significant search costs. The recommendation serves as a vehicle for signaling this information to the uniformed investor. The signal of new information then is reflected in the stock price on the announcement date. Because we report an incomplete reversal over a six-month period, our results may be viewed as a confirmation of the Barber and Loeffler conclusion that announcement day price increases result both from herding and the release of information. If one accepts this argument for an information effect, one must assume that the market is sufficiently inefficient that it will move significantly as a result of the pronouncement of a single opinion.

An alternative interpretation of our results may be offered from the momentum literature. Significantly positive alphas determined by the market model in the preselection period suggest that analysts have selected momentum securities. Because Equation (3) is not biased by the high alphas calculated for these securities, abnormal returns in the post-selection period simply may indicate a continuation of the momentum that the securities had prior to the selection. The information content of the selection then is reduced to the identification of a momentum security whose momentum may continue over the six-month contest period. Thus, the investment professional is providing no new information, but perhaps is benefiting by the continuation of such momentum.

Regardless of the information content in the announcement, it is clear that investors cannot benefit from following the advice contained in the announcement. Any attempt by an investor to purchase only those securities whose price has not been changed by the announcement could be an unproductive investment strategy. If an investor purchased the security at the end of the announcement day, according to estimates from our use of equation (3), the investor would earn on average a negative return of 1.03 percent. Waiting until the end of the second day would increase the loss to 1.71 percent. The market model estimates place the loss much higher. Investors clearly would not have gained from adopting a strategy of investing in the securities recommended in the Dartboard column.

For the sake of completion and to provide more direct comparisons to previous studies, we present a more detailed progression of cumulative abnormal return in Tables 4 and 5. Both tables report abnormal returns and cumulative abnormal returns for various periods from day –25 through day +125. Table 4 reports results over the

Table 4—A Direct Comparison of Abnormal Returns and Cumulative Abnormal Returns from January 1990 through November 1994

	Liang Results				Equation (3)			
Day	AR	z-AR	CAR	z-CAR	AR	z-AR	CAR	z-CAR
-25	-0.16	-1.96**	-0.16	-1.96**	-0.14	-1.66***	-0.14	-1.66***
-10	0.1	0.45	-0.54	-1.38	0.12	0.52	0.65	0.41
-9	0	0.62	-0.54	-1.2	0.07	1.05	0.72	0.65
-8	0.03	0.39	-0.51	-1.24	0.05	0.24	0.78	0.69
-7	-0.15	-1.21	-0.66	-1.46	-0.15	-1.57	0.63	0.31
-6	0.21	0.94	-0.45	-1.22	0.22	1.47	0.84	0.63
-5	0.64	2.60*	0.18	0.67	0.59	2.41**	1.43	1.14
-4	0.16	0.65	0.34	0.52	0.21	1.05	1.64	1.34
-3	0.04	0.14	0.38	0.48	0.25	1.32	1.90	1.59
-2	0.44	3.07*	0.82	0.09	0.51	3.10*	2.41	2.19**
-1	0.3	1.79***	1.12	0.41	0.24	1.57	2.65	2.46**
0	3.01	13.86*	4.13	2.86*	2.81	14.73*	5.46	5.30*
1	0.58	3.51*	4.71	3.40*	0.49	3.91*	5.94	5.95*
2	-0.14	-1.12	4.57	3.14*	0.03	0.13	5.97	5.82*
3	-0.13	-0.9	4.44	2.92*	-0.01	-0.93	5.96	5.55*
4	-0.36	-0.74	4.08	2.74*	-0.23	-0.02	5.73	5.45*
5	-0.27	-0.55	3.81	2.60*	-0.15	-0.19	5.59	5.33*
6	-0.37	-1.68***	3.44	2.29**	-0.32	-1.72***	5.27	4.94*
7	-0.35	-2.50**	3.1	1.87***	-0.24	-1.57	5.03	4.60*
8	-0.44	-2.22**	2.66	1.5	-0.31	-1.26	4.72	4.31*
9	-0.03	-0.69	2.63	1.37	0.14	0.39	4.86	4.31*
10	-0.31	-1.61	2.32	1.11	-0.34	-2.07**	4.52	3.91*
25	0.41	2.11**	2.53	0.8	0.35	2.27**	5.60	3.92*
50	0.21	1.00	1.61	0.21	0.31	1.07	5.26	3.29*
75	0.29	2.17**	0.25	0.32	0.25	1.64	5.61	3.12*
100	-0.23	-0.72	-2.32	-0.93	-0.07	-0.25	3.47	2.14**
125	-0.11	-1.19	-3.28	-1.14	0.00	0.22	4.05	2.25**

* Significant at the 1 percent level
** Significant at the 5 percent level
*** Significant at the 10 percent level
Note: Abnormal returns and cumulative abnormal returns using equation (3) are compared to the replicated results of Liang (1999) that uses data from January 1990 to November 1994

sample period used by Liang (1999)[10]. Table 5 reports results from our extended sample period.

[10] Exact identification of Liang's (1999) sample period is problematic. He states (p. 121): "From January 1990 to November 1994, there have been 54 contests; there are eight short sale recommendations and 208 buy recommendations from the experts. Data are available for 216 pros' stocks and 201 Dartboard stocks." This information is perplexing. There are 12 contests a year, so the 54th six-month contest would occur June 1994 not November 1994. The June contest would be completed in December 1994. There would be 216 selections in 54 contests. It is, however, highly unlikely that for a four and one-half year period, all the selections of the experts would be available from the CRSP database. Not being able to discern the exact sample period, we use the 59 contests from January 1990 through November 1994 to seek to replicate Liang's results. Our results are close, but not identical, to what Liang reports.

Table 5—Comparison of Abnormal Returns and Cumulative Abnormal Returns From January 1990 through December 1999

	Market Model				Equation (3)			
Day	AR	z-AR	CAR	z-CAR	AR	z-AR	CAR	z-CAR
-25	0.07	0.26	0.07	0.26	0.10	0.26	0.10	0.26
-10	-0.07	-0.71	-0.31	-0.82	0.02	0.09	0.08	0.37
-9	0.19	1.34	-0.12	-0.5	0.20	1.39	0.28	0.70
-8	-0.19	-1.83***	-0.31	-0.89	-0.11	-1.35	0.17	0.36
-7	-0.21	-1.59	-0.52	-1.2	-0.18	-1.43	0.01	0.02
-6	0.36	2.60*	-0.16	-0.62	0.38	2.81*	0.36	0.65
-5	0.54	3.80*	0.37	0.16	0.56	4.16*	0.92	1.54
-4	0.17	0.85	0.54	0.32	0.13	0.94	1.05	1.71***
-3	0.25	1.71***	0.79	0.64	0.31	1.76***	1.36	2.04**
-2	0.32	2.92*	1.1	1.16	0.34	3.07*	1.70	2.62*
-1	0.32	2.12**	1.43	1.52	0.30	2.00**	2.00	2.97*
0	2.89	18.18*	4.32	4.72*	2.77	17.62*	4.77	6.36*
1	0.67	5.22*	4.99	5.51*	0.68	5.45*	5.45	7.30*
2	-0.01	-0.5	4.98	5.31*	0.03	0.06	5.48	7.15*
3	-0.24	-1.79***	4.75	4.90*	-0.29	-2.27**	5.19	6.61*
4	-0.24	-1.12	4.51	4.62*	-0.16	-0.62	5.03	6.38*
5	-0.19	-0.53	4.32	4.44*	-0.11	-0.18	4.92	6.31*
6	-0.1	-0.84	4.22	4.22*	-0.10	-0.61	4.82	6.10*
7	-0.28	-1.98**	3.94	3.84*	-0.20	-1.16	4.62	5.81*
8	-0.44	-3.00*	3.5	3.32*	-0.27	-1.57	4.34	5.45*
9	0.11	0.39	3.61	3.32*	0.22	1.24	4.57	5.59*
10	0.07	0.21	3.68	3.29*	0.03	0.10	4.59	5.49*
25	0.12	0.48	3.51	2.30**	0.05	0.39	4.82	4.88*
50	0.25	1.87***	2.5	1.01	0.27	2.14**	4.70	4.13*
75	0.13	1.35	1.17	0.18	0.19	1.58	4.22	3.43*
100	-0.24	-1.55	0.11	-0.15	-0.04	-0.32	3.93	3.28*
125	-0.09	-0.71	-0.72	-0.52	-0.02	-0.24	3.74	3.00*

* Significant at the 1 percent level
** Significant at the 5 percent level
*** Significant at the 10 percent level

Note: Abnormal returns and cumulative abnormal returns for the time period day –25 to day +125 are reported for the entire dataset using both the market model assumptions of Liang (1999) and the assumptions of equation (3) in this paper

As is the case with the results reported in Table 3, the market model and equation (3) produce very different results. Both estimates from equation (3) and the market model indicate that abnormal returns were positive in the period prior to the announcement of the stock pick. We interpret this result to indicate that momentum was continuing until the time of the selection of the security. Significant abnormal returns in the trading days just prior to the announcement may be less charitably interpreted to indicate some form of market leakage. Abnormal returns are higher when determined using equation (3), as these abnormal returns are not biased downward from the large and biased alpha. Both models provide significant abnormal returns on the announcement date and the following trading day. As with the results reported in Table 3, reduction in abnormal returns is much greater when estimates

are made with the market model. At the end of the sample period, the cumulative abnormal return is negative according to the market model but significantly positive if estimates are made using equation (3).

The implications from these comparisons suggest that researchers should be careful in drawing inferences from market model results for extended time period event windows. A more appropriate research approach would involve running the event study using a variety of techniques including both the market model and the model suggested in this paper.

Conclusion

This paper studies a bias in applying standard event study methodology to samples including momentum securities. Using ten years of stocks selected by investment professionals for the *Wall Street Journal*'s Dartboard column, we show the impact of using an alternative approach for generating the expected return estimates used to calculate abnormal returns. This alternative model eliminates the nonstationarity bias that can occur in the alpha parameter estimate in the standard market model for long event periods.

In the case of the securities recommended in the Dartboard column, we find that analysts tend to select momentum securities. Estimation of the market model for these securities using pre-selection sample data produces positive alphas and creates downward bias in the estimation of abnormal returns. This bias is small when the event window is small, but as the event window widens we show that the bias has a substantial effect. We also find that estimating the market model with post-selection sample data produces bias in the opposite direction. To eliminate this problem, a CAPM-based model is employed to eliminate the need for the alpha parameter estimates in the market model.

In comparing results using our model to previous studies, we find our results to be most consistent with Barber and Loeffler who conclude that a sustainable information effect occurs upon the release of the stock selections of investment professionals. Although the initial price increase at announcement is partially reversed, the results support the conclusion that investment professionals are able to identify stocks that outperform the market on a risk-adjusted basis for a six-month contest period. Alternatively, our results are consistent with the hypothesis that investment professionals select momentum securities whose momentum at least partially continues through the contest period. Because much of this return occurs on the announcement day, investors who are not able to enter the market prior to the announcement are not likely to benefit from buying securities recommended by experts in the Dartboard contest.

Our most important conclusion, however, is that the choice of methodology can clearly affect estimates of abnormal returns and conclusions reached in an event study framework, especially an event study that utilizes long event windows for a

sample that includes momentum securities. The standard application of the market model determines expected returns by multiplying the market return by beta and adding an estimated alpha value. If the beta and alpha estimate are determined in periods where a security was experiencing momentum, the alpha value will likely be greater than zero. As alpha values are assumed to be zero, we find it difficult to explain why one would choose to use the market model in an event study that contains momentum securities when there is a readily available theoretically based alternative. This alternative requires the daily risk-free rate, but this information is currently easily available. Thus, when calculating long event windows, researchers should be cautious in drawing conclusions using traditional market model techniques and compare the results with techniques that do not rely on alpha estimates. We have shown the results of comparisons using standard event study methodology and an alternative studying recommendations by investment analysts included in the Dartboard contest. Further studies may wish to examine conclusions reached in other event studies, such as recommendations by investment professionals reported elsewhere.

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