The Rodney L. White Center for Financial Research

Mutual Fund Returns and Market Microstructure

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Mutual Fund Returns and Market Microstructure

Abstract

Equity mutual funds earn large positive returns on the last day of the year, and large negative returns on the following day. The same applies on a smaller scale at quarter-ends that aren't month-ends. Empirical evidence from a variety of sources, including portfolio disclosures and intra-day equity transactions, supports the hypothesis proposed in Zweig (1997) that a subset of fund managers deliberately cause the price shifts with buy orders, intending to move return to the current period from the next. Cross-sectional tests show the largest effect in the period's best performers, consistent with their extra incentive to add to their current returns.

The share price of an open-end mutual fund is not negotiated in a market. It is inferred from the negotiated prices of the fund's holdings, typically their closing prices on their primary exchanges. And while there are obvious benefits from pricing off these arms-length transactions, there is a potential cost from the bid/ask spread. The location within the spread of a stock's closing trade has little or no intrinsic significance, but it passes straight through to the prices of the funds positioning it.

This would be a trivial consideration if buyers and sellers of the fund's holdings initiated closing trades approximately equally, but we argue here that they don't. At the ends of calendar quarters, and especially the end of the year, equity funds earn big positive returns for the last day, then big negative returns the next. Empirical tests on fund returns, intraday stock returns and portfolio disclosures support the view that end-of-quarter fund valuations are temporarily inflated because many of their holdings close higher than they trade just before and after. The evidence further suggests that fund managers engineer these higher closings to increase one period's return at the expense of the next. Both agency issues and the well-documented funds flow-performance relation may motivate this behavior among investment managers.

The rest of the paper is in six sections. Section I covers the background and the relevant literature, Section II describes the data, Section III analyzes the time series and cross section of daily mutual fund returns, Section IV compares stocks' year-end closing prices with transaction prices before and after, Section V compares the price behavior of stocks held by the year's winner and loser funds, and Section VI summarizes and concludes.

I. Background and Literature

The strategic environments of both retail and institutional investors are qualitatively different at year-end. There is the tax-year change, distorting the incentive to realize capital losses and gains. There are reporting and capital-standard requirements applied to year-end portfolios, liquidity demands for year-end gifts and bonuses, and for money managers, there is the transition from one calendar-year return to the next. In this context, anomalies in year-end price shifts are interesting not only as trading ideas but as comparative statics that indirectly reveal the decision process generating trades in the first place.

The finance literature has already uncovered and analyzed many peculiarities of year-end price shifts. Most attention has focused on small-cap stocks. Relative to big-cap stocks, small-cap stocks shift significantly over the five trading days starting with the last of the year (Keim (1983), Roll (1983)) with a persistence across years that defies risk-based explanations. One popular explanation is the tax-loss selling hypothesis which has the retail investor demand decreasing for stocks with poor past performance (see, e.g., Roll (1983), Ritter (1988)). Another explanation has disclosures shifting institutional investor demand (e.g. Haugen and Lakonishok (1988), Musto (1997)). Neither explains why the shift starts a day *before* the year-end.

At the market microstructure level, Harris (1989) shows that transactions prices systematically rise at the close, and that this "day-end" anomaly is largest at month-ends (with only one year of data, he does not consider quarter- or year-ends separately) and when the last transaction is very near to the close in time. Harris also finds that the effect is stronger for low-priced firms, and that buyers more frequently appear to initiate day-end transactions.

The literature also documents that institutional-investor trading can significantly affect market prices. Harris and Gurel (1986) show that prices on new constituents of the S&P 500 index abnormally increase more than three percent upon announcement, all of which is eliminated within two weeks. Lynch and Mendenhall (1997), studying a period when S&P additions and deletions were announced several trading days in advance, show transaction prices to be temporarily low on deletion days and high on addition days. This effect is understood to be caused by index fund management.

Zweig (1997), looking at mutual fund shares, uncovers one price shift before the year-end and another one after, and offers an explanation for both. From 1985 to 1995, the average equity fund outperformed the S&P 500 by 53bp (bp=basis points, 1/100 of 1%) on the year's last trading day, and *under*performed by 37bp on the next year's first trading day. Small-cap funds shifted more: 103bp above the S&P, then 60bp below. This is an odd fit with the price shifts of small-cap indices, which generally beat the market on both days in those years. The explanation offered is that some subset of fund managers deliberately causes the pattern by manipulating its year-end valuations.

In SEC terminology, "marking the close" is "the practice of attempting to influence the closing price of a stock by executing purchase or sale orders at or near the close of the market," (SEC release #36556, December 6, 1995). One explanation offered by Zweig (1997), which we call the marking-up model, is that fund managers mark the close of their holdings with buy orders. The policy of most equity funds is to value each holding at the last reported trade price on its primary exchange. For example, if IBM last trades on the NYSE at 172½, then 1000 shares will be valued at $172,500, even if soon trades at 172 somewhere else. Portfolio managers can therefore boost their funds' valuations on a given day - and by implication their total returns over any period ending on that day - with this strategy. The downside is the opposite effect on the next period's return.

Because of the way fund managers are compensated, and because of the flow-performance relation in mutual fund assets, the obvious target for this strategy is the calendar-year return. Returns over calendar years figure disproportionately in the analysis of fund performance in the press, mutual-fund ratings and databases, and the academic literature. Managers are compensated for high annual numbers, either directly with performance bonuses, or indirectly with new investment. The convexity of the new investment/annual return relation (Ippolito (1992), Sirri and Tufano (1998)), combined with the weakness of performance persistence (Hendricks, Patel and Zeckhauser (1993), Brown and Goetzmann (1995), Carhart (1997)), suggests an especially strong incentive for the year-to-date's best performers to increase their year-end portfolio value at the expense of the next year's return. They are currently in the high-slope region of the investment/performance graph, and are unlikely to be there next year, so there is more benefit than expected cost from inflating the year-end portfolio value.

It isn't necessary for all funds to mark the close for funds in general to show the pattern. If funds concentrate in certain equities, and a few determined fund managers increase their valuations by marking up some of these securities, then other funds will participate in the marking effect of these managers. Those responsible may not even manage mutual funds; calendar-year returns are also important in other institutional-investor categories, such as pension and hedge funds. Pension and hedge fund managers may herd with mutual funds when picking stocks, and then mark the close.

Section II describes our database, and Section III establishes the statistical significance of the price shifts, extending the test on other period transitions – quarter-ends, and also month-ends. We then sort funds into groups with more or less incentive to move return from the next period, and test cross-sectionally.

II. Data

Our study uses data from four sources: Standard & Poor's Micropal, CDA Investment Technologies, New York Stock Exchange's Trade and Quote (TAQ) Database, and the Center for Research in Security Prices (CRSP). We use daily fund return data from January 1986 through May 1996 from Standard & Poor's Micropal, Inc. The database includes some funds that have left the sample since 1987, though it probably misses some funds that left before 1991. The returns are adjusted for splits and distributions. We focus on actively managed U.S. equity funds by limiting our study to funds in the following three groupings: Aggressive Growth (AG), Growth and Income (GI), and Long Term Growth (LG) funds. The investment objective of AG funds is capital appreciation, and their prospectuses allow investments in very short-term or unusually risky securities. GI funds are intended to provide growth of capital with income. LG funds are those that have long-term growth of capital as the primary objective and income as a secondary consideration. The Micropal daily return database covers the universe of U.S funds, and has 2207 funds in the three categories as of May 1996.

Data from CDA Investment Technologies, Inc. provide quarterly portfolio holdings from 1989 through 1995. Previously used by Grinblatt, Titman and Wermers (1995), they cover 963 funds in the three categories. Holdings are identified by CUSIP, which we use to link with our other databases. Some CUSIPs could not be found in the other databases. The portfolio holdings data are survivorship-bias free.

We take intraday stock price data from 1993 through 1997 from the TAQ database. These data cover all stocks listed on the New York Stock Exchange (NYSE), American Stock Exchange (AMEX), as well as Nasdaq National Market System (NMS). Daily, monthly and annual stock-return data, as well as capitalization data, are from CRSP.

III. Mutual Fund Price Shifts around Period-Ends

The initial test addresses the statistical significance of the price shifts, first on the three categories combined, then separately. We can test for the year-end pattern as well as similar patterns at quarter-ends and month-ends with simple dummy variable regressions. We test two propositions: whether fund returns are significantly different from the S&P, and whether the proportion of funds beating the S&P is significantly different from usual. So the dependent variable in the first set of regressions is the (equally-weighted) return of the funds in excess of the S&P 500. In the second set of regressions, the dependent variable is the fraction of funds beating the S&P that day. In both regressions, the independent variables are 1/0 dummies for: year-end and the following day, *YEND* and *YBEG*, respectively; quarter-end (other than a year-end) and the following day, *QEND* and *QBEG*, and month-end (other than a quarter-end) and the following day, *MEND* and *MBEG*. Our daily mutual-fund data extends from the beginning of 1987 through May of 1996, which covers 9 year-ends, 37 quarter-ends, and 112 month-ends. Results are collected in Table I.

Even with just nine observations, the year-end pattern is significant on both days for the whole sample and for each category, and in the mean excess returns in Panel A and the fraction of funds with positive excess returns in Panel B. 80% of funds beat the S&P on the last day of the year (i.e. b_0+b_1) , compared with only 30% the next day (b_0+b_2). The highest intensity is in the AG category, with 89% above on the last day, and only 26% on the next. The pattern applies to quarter-ends on a reduced scale, though the p-values for *QBEG* generally exceed the usual rejection levels. There is no evidence of the price shifts for month-ends that aren't quarter-ends.

These numbers add support for the marking-up hypothesis. Quarter-ends are influential in mutual-fund analysis, though less so than year-ends. For example, the *Wall Street Journal* analyzes each calendar-quarter's relative fund returns, and Morningstar updates ratings as of calendar quarters. Other month-ends show nothing (despite many more observations), ruling out month-end explanations for the effect, such as the monthly transfer from paychecks to pensions or other savings plans.

If marking the close causes the up-down pattern, we should detect it cross-sectionally. Across funds, the bigger upward returns should precede bigger downward returns, so a cross-sectional regression of day *d* returns on day *d*-1 returns should fit a lower slope coefficient if *d*-1 is a quarter-end or year-end. We test this hypothesis with another dummy-variable regression. First, we regress day *d* fund returns on same-fund *d*-1 returns for each day (except the first) in the database, and save the fitted cross-sectional slope b_d. This is done for all categories in one regression, and then for the separate categories. The time series of slopes is then regressed on *YBEG*, *QBEG* and *MBEG* (i.e. *d* begins a year or quarter or other month) from above. Table II reports the results.

In the whole sample, cross-sectional coefficients are significantly negative for year-ends and quarter-ends, compared to a significantly positive intercept. Relatively high returns one day generally predict relatively high returns the next, but at year-ends and other quarter-ends, the opposite is true. In the subsamples, the loadings on *YBEG* and *QBEG* are all negative, though only two of six are statistically significant at the 5% level. These numbers support the view that the price shifts reflect a transitory shock to portfolio valuations, and that some funds are more exposed than others.

B. Marking-up to beat a benchmark

The effect should increase with both the opportunity and the motive to shift return from the next period. A fund's opportunity depends on its weight in large-spread stocks, a good match to the bigger shifts in AG funds here and in small-stock funds in Zweig (1997). The cross section of motive is less clear. One potential motive for moving return from next year is to beat an important benchmark, in particular the total return of the S&P 500. Zweig (1997) observes that a large number of funds just below the S&P as of the second-to-last day of the year, which we'll call day –1, are above it after the last day, day 0. This could reflect manipulation, but it doesn't have to. The empirical question is whether there are *more* funds getting what they need on day 0 to beat the S&P than the high distribution of day 0 fund returns would predict.

To address this issue, we compare in each category the number of funds that passed the S&P on day 0 with the number of funds that *would have* passed the S&P if the day 0 returns all came from the same distribution. For each year y, we take $r_{SP,y}$, the S&P's total return for y as calculated by Ibbotson Associates, and calculate $r_{f,y,-1}$ and $r_{f,y,0}$, fund f's total year y return up to the second-to-last and last days of y, respectively. These imply $NEED_{f,y} = (1+r_{SP,y})/(1+r_{f,y,-1})-1$, the return f needs on day 0 to beat the S&P for the year, $GOT_{f,y} = (1+r_{f,y,0})/(1+r_{f,y,-1})-1$, what f actually got on day 0, $BEAT_{f,y} = 1$ if $r_{f,y,0}>r_{SP,y}$ (i.e. f beat the S&P for y) and 0 otherwise, and $LOST_{f,y}=1-BEAT_{f,y}$. Finally, we summarize the unconditional distribution of day 0 returns of funds in category c and year y with the function $CDF_{c,y}$, so that $CDF_{c,y}(x)$ is the fraction of funds in c with $GOT_{f,y}$#x.

With this notation, the probability that f beats the S&P in y is E[$BEAT_{f,y}$], where E[A] is the expectation operator. Under the null hypothesis that managers are *not* making a special effort to beat the S&P, E[$BEAT_{f,y}$] is (1!$CDF_{c(f),y}(NEED_{f,y})$), where $c(f)$ is f's category. Under the alternate hypothesis, E[$BEAT_{f,y}$] is larger. Analogously, E[$LOST_{f,y}$] is $CDF_{c(f),y}(NEED_{f,y})$ under the null, and smaller under the alternate. For each category c, we sum $CDF_{c(f),y}(NEED_{f,y})$, (1!$CDF_{c(f),y}(NEED_{f,y})$), $LOST_{f,y}$ and $BEAT_{f,y}$ across y and the f in c, and sort the results by whether the funds were ahead of or behind the S&P on day !1.

We do not have confidence intervals for the results, but they clearly do not indicate any intentional activity to beat the S&P. For the LG and AG categories, the number of funds beating the S&P is almost exactly the same as the unconditional distribution predicts. There are many more funds moving ahead of the S&P on the last day than falling behind it (124 to 4 among LG funds and 95 to 1 among AG funds) but these numbers are very close to what would be expected from the high-mean distribution.

With GI funds, the numbers skew the other way; 36 funds moved ahead of the S&P on the last day, but the expectation under the unconditional cdf was 67.

Maybe fund managers are trying instead to beat a zero return, rather than the S&P – that is, to be positive for the year. To examine this possibility, we redefine the variables appropriately: $NEED_{f,y} = 1/(1+r_{f,y,-1})-1$, and $BEAT_{f,y}$ is 1 for $r_{f,y,0}>0$, and 0 otherwise. The null hypotheses are as before, so we calculate the same sums and report the results as Panel B of Table 3.

The analysis is the same as Panel A. We don't have significance tests, but the numbers aren't going the right way anyhow. Again the surplus of funds moving ahead of rather than behind the benchmark on the last day is positive for LG and AG funds, but no more than the high distribution predicts.

C. *Marking-up to improve a good performance*

Provided that the flow/annual return relation of Ippolito (1992) and others is causal – that the annual return directly causes the flow (as in Brown Harlow and Starks (1996) and Chevalier and Ellison (1997)), rather than some other force such as the identity of the manager causing both – its convexity encourages marking-up. If we sort funds by their year-to-date return going into the last day, we should find by this argument that the best performers evidence above-average inflation of year-end valuations.

We can gauge the empirical validity of this argument by sorting turn-of-the-year returns by recent performance. The day after day 0, the first trading day of the year, we call day 1. The hypothesis is that fund *f*'s day 0 return is higher, and its day 1 return lower, when $r_{f,y,-1}$ is higher. First, some graphs: funds are sorted within categories each year by $r_{f,y,-1}$ into twenty equal-weighted portfolios whose subsequent day 0 and day 1 returns in excess of the S&P 500 are calculated. The results, averaged across the nine year-ends, are plotted as Figures 1A, 1B and 1C, with the worst-performance bins on the right.

All three plots show the price shifts affecting all performance bins at least somewhat, and a stronger effect for the top bin. In the AG and LG categories, the top 5% has the highest day 0 mean and the lowest day 1 mean. In the GI category, the top 5% has a much larger day 0 mean, but its day 1 mean also appears above average. To establish the statistical significance of this difference, we can deploy the dummy-variable model from Table I, but with the dependent variable replaced by a winner-loser portfolio. For each trading day *d*, each fund category is sorted by performance over the 252 trading days (i.e. one year, give or take a day) ending *d*-1. The top ten performers are assigned to the winner portfolio, and the rest to the loser portfolio.[1] The returns on each portfolio are calculated for *d*, and the dependent variable is the winner return minus the loser return. The hypothesis is that it loads positively on *YEND* and negatively on *YBEG*. The quarter-end and month-end dummies are also included, and the results are in Table IV.

The p-values indicate statistical significance for the whole sample and for the AG funds separately at the year-end. This supports the view that at least some of the managers of the best-performing funds actively mark up their closing prices to increase expected fee income or personal compensation.

[1] Results are very similar if the winner portfolio is the top 5% or top 10% of funds, rather than the top 10 funds. We went with this specification because the number of funds in each category grows over time, so the number of funds in the top *n*% grows over time, causing the variance of the winner portfolio to fall over time. Fixing the number of funds in the winner portfolio solves this problem, and does not cause a similar problem in the loser portfolio because it has so many funds in it that the additional diversification is trivial.

We can approach the marking-up question from the other direction, testing directly whether the stocks held by the best-performing funds are manipulated at year-end. The only handicap is that we do not directly observe funds' day –1 portfolios. So we estimate: in the next section, we first estimate that the best-performing funds hold the best-performing stocks, and in the section after that, we estimate that they hold the stocks listed in the most recent portfolio disclosure on or before the year-end. The empirical question is whether those stocks' transaction prices shift up at the year's close, and then back down at the next year's open.

IV. Year-End Price Shifts of Winner and Loser Stocks

The TAQ database covers five year-ends, 1993/4 through 1997/8. With this data we can track all the trades of a given stock between two given moments. We track every stock available from the close of day –1 to the close of day 1, with the goal of comparing the day 0 close to transaction prices just before and after. If the managers of the year's best-performing mutual funds, or hedge funds, or any other group of equity portfolios try to engineer high closing prices for their holdings at year-end, we should see the recent winner stocks closing high on day 0, relative to where they traded an hour or day before, or where they open after New Year's.

For a given year-end y, our universe is all equities in TAQ with a total return from CRSP from the end of June to day –1, so we can sort by recent performance. For stock s we call this $PERF_{y,s}$. We also grab a day –1 market capitalization if it is available, but we don't require it. We identify six transaction prices for stock s: $P_{s,y,-1,4PM}$, the last by the close of day –1; $P_{s,y,0,10AM}$, the last by 10AM of day 0; $P_{s,y,0,3PM}$, the last by 3PM of day 0;

$P_{s,y,4PM}$, the last by the close of day 0; $P_{s,y,1,10AM}$, the last by 10AM of day 1, and $P_{s,y,1,4PM}$, the last by the close of day 1. Notice that these could all be the same transaction. If we required them to be separate transactions we would lose our least liquid stocks, which are intuitively the best candidates for manipulation.

We transform the prices into cumulative returns r, so $r_{s,y,d,t} = P_{s,y,d,t}/P_{s,y,-1,4PM} - 1$, and the returns are compiled *via* day –1 capitalizations into a value-weighted index $r_{VW,y,d,t}$. For each y we sort stocks by *PERF* into performance-quintile portfolios and calculate the equal-weighted average of $r_{s,y,d,t}$ for all d and t within each portfolio. The results, averaged across the five years, are plotted as Figure 2A.

The price shifts of winners and losers are very different. The loser portfolio gains 2½% on both day 0 and day 1, compared with only ¼% per day for the VW index. This is exactly the turn-of-the-year effect already documented in earlier years – big returns for small stocks, especially recent losers (*e.g.* Givoly and Ovadia (1983), Sias and Starks (1997)). The winner portfolio, on the other hand, goes nowhere. The top-quintile stocks gain only 2bp over the two trading-days. But at the year's close in the middle, they are up 81bp, where 46 of those bp came in the last hour of the year and 44 of them were gone 30 minutes into day 1. The in-between quintiles are in between, in exact order.

To put some distance between our results and the well-known small-cap/big-cap year-end dynamic, we control for size by recalculating the performance-quintiles using only the smallest-cap quintile, plotted as Figure 2B, and then using only the largest-cap quintile, Figure 2C. The small-quintile results show the same relative movements, though the returns are all higher. Losers are way above the VW index in every interval, making 6.3% in total. Winners are up 109bp by the end of the year, of which 99bp came in the last hour. This does not reverse on the next day, though they do lag the market, making 6bp rather than 21. Again, the other quintiles are in-between in exact order.

The large-cap results also show the same relative movements, except now the returns are all lower. Losers make money on both days, while winners make 37bp on day 0, 22 in the last hour, and then lose 94bp in the first 30 minutes of day 1 and 50 more over the rest of the day. And the other quintiles line up in order.

Our intraday results fit the scenario where winner funds mark up their holdings. Winner stocks are higher at the close of day 0 than they are one trading day before or after, and most of that difference appears at the last moment and is gone half an hour of trading later. Controlling for size, we still find that day 0 is relatively good for winners and day 1 is relatively bad, and that most of the action is in a small window around the close. These results can also explain why funds in general could manifest the price shifts when only a few managers actively mark the close. Grinblatt, Titman and Wermers (1995) show that fund managers bias toward recent-winner stocks, presumably betting on the momentum effect of Jegadeesh and Titman (1993). This connects their returns to any manipulation of winner stocks, so the shape of Figures 1A-1C is a natural consequence of the shape of Figures 2A-2C.

The intraday behavior of winner stocks around the year-end supports the argument that winner funds' managers mark-up their portfolios. However, it also fits the scenario where winner stocks close high for some other reason, which would affect funds in general because they tend toward holding recent winners, and winner funds in particular because they in particular hold recent winners. To discriminate between our hypothesis and this other scenario, we need an estimate of winner funds' constituent stocks that includes their loser holdings as well.

V. Returns of Stocks held in Winners' Disclosed Portfolios

In the marking-up model, fund managers target the day 0 closing price of their existing, i.e. day –1, holdings. Absent data limitations, we would collect the day –1 portfolios of the year-to-date top performers and compare their day 0 closing prices to their prices before and after. The hypothesis would be that both winners and loser stocks held by winner funds would close high on day 0. The loser stocks held by winner funds could be especially high; a winner-fund manager would be least likely to inflate the returns of competing winner funds if he marked-up his loser stocks.

We do not observe day –1 holdings; the best we can do is to look at the holdings most recently disclosed by the winning funds as of day 0. December disclosures are very common, so for those funds we have very timely data (abstracting from the window-dressing distortions induced by disclosures (*e.g.* Lakonishok, Shleifer, Thaler and Vishny (1991))). Funds must disclose every six months, so the stalest data at year-end is from July disclosures. The empirical question is whether the stocks in the winners' portfolios are relatively *more* overvalued at the day 0 close than other stocks, *controlling for* recent performance and capitalization.

The usable CDA data covers the 1989 through 1995 year-ends, so the overlap between CDA and TAQ is just three year-ends. Consequently, we will not use the intraday data for this test, and instead track the stocks in the daily CRSP data. Our measure of a stock's overvaluation is the day 0 return minus the day 1 return, which for stock *s* in year *y* we call $OVAL_{s,y}$.

There are three steps in the test design: sorting stocks by size and performance, identifying the stocks held by winner funds, and then comparing the average *OVAL* of winner-fund stocks to those of all other stocks within size and performance quintiles. For a given year *y*, we sort stocks into quintiles by day –1 capitalization, and separately by ½-year return ending day –1 (i.e. the same sorts as in Section IV). Then we identify the top 10% of funds by year-to-date performance as of day –1, and label their last disclosed holdings as of 12/31/*y* as *y*'s winner-fund stocks.[2] All other stocks are considered non-winner-fund stocks. Then, for each pair (*i*,*j*), *i*,*j* from 1 to 5, we calculate the average of $OVAL_{s,y}$ for all non-winner-fund stocks assigned to size-quintile *i* and performance quintile *j*. Finally, for each winner-fund stock we calculate the difference between its *OVAL* for *y* and the average *OVAL* of the non-winner stocks in the same size and performance quintiles, so this is the abnormal overvaluation of the stock given its size and recent return. This procedure is repeated for each year. Results are reported, by quintile, in Table V.

The results support the marking-up model over the alternate hypothesis that winner funds are inflated because, for some reason, winner stocks are inflated. The grand-mean of observations is statistically significant with a point estimate of 51bp, and all but one of the row and column means are statistically significant in the predicted direction. The overvaluation extends down to the worst-performing stocks held by winner funds. In fact, the portfolio with the smallest and worst-performing stocks shows the most overvaluation of winner-fund holdings, which is consistent with their managers trying to improve their returns *relative* to close competitors by targeting stocks that other winner funds are least likely to hold.

VI. Summary and Conclusion

We demonstrate a number of empirical regularities in mutual-fund returns. Together, they support the hypothesis that some fund managers mark-up their portfolios to improve calendar-year, and to a lesser extent, calendar-quarter, returns. This is most intense among the year's best performers. We show that:

- Equity funds earn much more than the S&P 500 on the last day of the year, and much less on the first day of the next year. This applies on a smaller scale to quarter-ends, but not month-ends that aren't quarter-ends. Aggressive-growth funds show the strongest effect.
- Across funds, better end-of-period returns precede worse beginning-of-period returns.
- Many funds move ahead of the S&P on the last day of the year, and very few fall behind it, but this is a symptom of the distribution of fund returns and not a result of intentional activity to beat the index. The same goes for beating a zero return.
- The year's best-performing funds do the best on the last day of the year, and the worst on the following day.
- Winner stocks are relatively higher at their year-end close than they are an hour before, or 30 minutes into the next trading day.

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[2] If we look at the top 10 funds, we get very few observations for the low-performance and low-capitalization bins. The point estimates are, however, very similar, and are also very similar if we use the top 5% rather than 10%.

- Stocks in the disclosed portfolios of winner funds are especially overvalued at the year-end, compared to other stocks with similar size and recent performance.

The year-end overvaluation and the marking-up explanation were first reported in Zweig (1997), which also observes that the practice is illegal but hard to punish because the trading itself is not illegal, only trading with the intention of overvaluation. Our results here indicate the intention of overvaluation but do not identify particular funds.

One theme running through the finance literature is the search for predictable out-performance by money managers. The results here contribute significantly to this search. We show that funds outperform the S&P by half a percent on average, not over a year, but in just *one day*. Year-ends plus quarter-ends add up to a percent per year above the S&P, whereas the first days of the year and quarters add up to minus ¾ percent. The obvious prescription for beating the S&P is to hold the S&P every day except ends of calendar quarters, when open-end funds are held instead, the best-performing aggressive-growth funds if possible, and to be sure to get out that day and not the next. This may or may not be feasible, depending on the fund. Fund families often give themselves the right to deny investments or withdrawals they consider abusive, and this strategy would probably qualify as abusive.

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Table I

Month-End Mutual-Fund Price Shifts

Model is

$$X_d = b_0 + b_1 YEND_d + b_2 YBEG_d + b_3 QEND_d + b_4 QBEG_d + b_5 MEND_d + b_6 MBEG_d + \varepsilon_d$$

In Panel A, the dependent variable in each regression is an equal-weighted index of funds, first the AG, GI and LG categories together, and then separately. In Panel B, the dependent variable is the fraction of funds in the indicated universe that beat the S&P 500 for that day. $YEND_d$ is 1 if d is the last trading day of December, $YBEG_d$ is 1 if $YEND_{d-1}$ is 1, $QEND_d$ is 1 if d is the last trading day of March, June or September, and $QBEG_d$ is 1 if $QEND_{d-1}$ is 1, $MEND_d$ is 1 if d is the last day of January, February, April, May, July, August, October or November, and $MBEG_d$ is 1 if $MEND_{d-1}$ is 1. Panel A is in basis points, Panel B is in percentage points, and two-sided p-values for the null hypothesis of a zero coefficient are below in italics, reported as percentages. Each regression has 2362 observations.

Panel A: Dependent Variable is Index Return

X	b_0	b_1	b_2	b_3	b_4	b_5	b_6
All							
	0.28	48.03	-32.93	17.36	-11.21	-1.00	5.68
	73.64	*0.02*	*0.72*	*1.82*	*12.69*	*82.53*	*21.04*
AG only							
	0.39	85.81	-42.95	35.67	-19.46	5.79	9.32
	75.02	*0.01*	*1.60*	*0.09*	*6.88*	*38.09*	*15.80*
GI only							
	0.18	20.00	-21.43	5.98	-5.82	-5.41	3.16
	78.40	*5.49*	*3.02*	*31.31*	*32.63*	*13.96*	*38.77*
LG only							
	0.27	43.99	-34.33	13.91	-9.70	-2.07	5.24
	72.81	*0.03*	*0.28*	*4.38*	*15.98*	*62.65*	*21.90*

Panel B: Dependent Variable is % of funds above S&P 500

X	b_0	b_1	b_2	b_3	b_4	b_5	b_6
All							
	50.99	28.81	-20.59	14.12	-9.19	-0.20	6.73
	0.01	*0.07*	*1.08*	*0.36*	*5.79*	*94.80*	*2.47*
AG only							
	51.30	38.10	-25.61	22.38	-15.36	5.08	7.85
	0.01	*0.02*	*0.72*	*0.01*	*0.73*	*14.99*	*2.62*
GI only							
	50.90	18.90	-14.44	7.21	-3.86	-4.06	6.19
	0.01	*2.18*	*6.46*	*12.43*	*40.99*	*16.05*	*3.25*
LG only							
	50.84	29.86	-21.56	13.78	-8.81	-0.73	6.52
	0.01	*0.05*	*0.84*	*0.50*	*7.25*	*81.01*	*3.15*

Table II

Daily Cross Sectional Regressions on Lagged Returns

Model is

$$b_d = \lambda_0 + \lambda_1 YBEG_d + \lambda_2 QBEG_d + 8_3 MBEG_d + \varepsilon_d$$

$RET_{f,d}$ is the day *d* return of fund *f*, for *d* from January 5, 1987 to May 6, 1996. For each *d* we run a cross-sectional regression of funds' day *d* returns on their day *d*-1 return, saving the fitted slope coefficient b_d. We then regress the b_d on three dummy variables: $YBEG_d$, which is 1 if *d*-1 is the last trading day of December, $QBEG_d$, which is 1 if *d*-1 is the last trading day of March, June or September, and $MBEG_d$, which is 1 if *d-1* is the last trading day of any other month. We run the test first on Aggressive Growth, Growth and Income and Long-Term Capital Gains funds combined, and then separately. Two-sided p-values for the null hypothesis of a zero coefficient are below, in italics, reported as percentages. Each regression has 2361 observations.

	8_0	8_1	8_2	8_3
All	0.0355	-0.2418	-0.1407	-0.0239
	0.01	*1.37*	*1.18*	*48.81*
AG	0.0390	-0.5408	-0.1068	0.0457
	0.01	*0.01*	*7.38*	*21.52*
GI	-0.0125	-0.1632	-0.1451	-0.0667
	7.71	*14.62*	*2.33*	*9.13*
LG	0.0427	-0.1192	-0.0800	-0.0410
	0.01	*25.26*	*17.78*	*26.25*

Table III

Predicted *vs.* Actual Number of Funds Beating the S&P and Zero

For year *y*, $r_{SP,y,-1}$ and $r_{SP,y,0}$ are the S&P 500's total return to the second-to-last and last trading days, respectively, and $r_{f,y,-1}$ and $r_{f,y,0}$ are the contemporaneous total returns of fund *f*. In Panel A, $NEED_{f,y}$ is the last-day return needed to beat the S&P for the year, $(1+r_{SP,y,0})/(1+r_{f,y,-1})-1$, and $BEAT_{f,y}$ is 1 $r_{f,y,0}>r_{SP,y,0}$ and 0 otherwise; in Panel B, $NEED_{f,y}$ is the last-day return needed for a positive return for the year, $1/(1+r_{f,y,-1})-1$, and $BEAT_{f,y}$ is 1 if $r_{f,y,0}>0$ and 0 otherwise. $GOT_{f,y}$ is the actual last-day return, $(1+r_{f,y,0})/(1+r_{f,y,-1})-1$, and $LOST_{f,y}=1-BEAT_{f,y}$. A fund is assigned to the *Behind* row if $r_{f,y,-1}<r_{SP,y,-1}$, and *Ahead* otherwise. The numbers in italics are predictions of the numbers above under the unconditional distribution. $CDF_{c,y}(x)$ is the fraction of funds in category *c* with $GOT_{f,y}\#x$; The prediction for a cell in the *LOST* column is the sum of $CDF_{c(f),y}(NEED_{f,y})$ for the funds in that row, and the prediction for a cell in the sum of $(1-CDF_{c(f),y}(NEED_{f,y}))$.

Panel A: Beating the S&P 500

Category:	AG		GI		LG	
	LOST	*BEAT*	*LOST*	*BEAT*	*LOST*	*BEAT*
Behind	1410	95	1938	36	2755	124
	1409.0	*96.0*	*1906.5*	*67.5*	*2751.4*	*127.6*
Ahead	1	962	7	665	4	1292
	2.2	*960.8*	*11.8*	*660.2*	*7.4*	*1288.9*

Panel B: Beating Zero Return

Category:	AG		GI		LG	
	LOST	*BEAT*	*LOST*	*BEAT*	*LOST*	*BEAT*
Behind	523	41	536	15	949	34
	513.8	*50.2*	*532.5*	*18.5*	*939.2*	*43.8*
Ahead	3	1901	31	2064	24	3168
	4.7	*1899.3*	*21.7*	*2073.3*	*21.4*	*3170.6*

Table IV

Winner Minus Loser Fund Returns around Month-Ends

Model is

$$X_d = b_0 + b_1 YEND_d + b_2 YBEG_d + b_3 QEND_d + b_4 QBEG_d + b_5 MEND_d + b_6 MBEG_d + \varepsilon_d$$

Funds are sorted by total return within category c over the 252 days ending d-1. The top 10 are the winner portfolio of funds, and the rest are the loser portfolio, both equal-weighted. The winner return minus the loser return on d is denoted $WML_{c,d}$. This is done first for c = all three categories, and then for the categories separately. The independent variables are dummies: $YEND_d$, $QEND_d$ and $MEND_d$ are 1 for d = last trading day of the year, quarter (other than year-end), and month (other than quarter-end), respectively, and $YBEG_d$, $QBEG_d$ and $MBEG_d$ indicate the following days, respectively. Figures are in basis points, and two-sided p-values for the null hypothesis of zero coefficients are beneath, in italics, reported as percentages.

X	b_0	b_1	b_2	b_3	b_4	B_5	b_6
All							
	1.60	40.70	-45.13	10.07	-21.27	5.52	1.27
	14.54	*1.12*	*0.49*	*29.71*	*2.77*	*35.44*	*83.12*
AG only							
	1.85	24.03	-54.14	1.99	-7.95	1.65	1.21
	3.51	*6.05*	*0.01*	*79.60*	*30.26*	*72.96*	*79.95*
GI only							
	0.74	6.06	-5.16	-2.54	-2.87	2.20	2.29
	15.65	*42.55*	*49.79*	*57.93*	*53.19*	*43.67*	*41.78*
LG only							
	1.04	10.66	-22.26	0.43	-9.97	5.70	-1.62
	20.47	*37.10*	*6.19*	*95.21*	*16.49*	*19.86*	*71.55*

Table V

Measures of Price Effects in Stocks Held by Top 10% of Funds

Every stock held by the top 10% of funds is assigned to capitalization/performance category every year. Stocks are assigned to size categories based on CRSP annual capitalization rankings. Performance quintiles for stocks are based on the previous six-months' return not including last day of the year. The average of day 0 – day 1 returns for stocks not held by the top 10% of funds is computed every year for each capitalization/performance category. The Winners-Cell Average row reports the average difference between day 0 – day 1 returns of stocks held by winning portfolios and their cell averages for that year. The last row and column summarize the observations in their respective columns and rows. P-values are for a t-test of the null hypothesis that the absolute value of the Winners-Cell Average statistic is zero. The holdings of the top 10% of funds are determined from the last calendar-year portfolio disclosures of those funds in the top 10% of funds based on past year's performance up to but not including the last day of the year.

Capitalization Quintiles		Performance Quintiles 1 (Losers)	2	3	4	5 (Winners)	All
1 (smallest)	#Held by Top 10% / others	39/519	17/291	13/282	14/212	29/382	112/1686
	Winners-Cell Average	0.0766	0.0077	0.0039	-0.0100	0.0158	0.0311
	P-value	*0.08%*	*56.92%*	*89.27%*	*47.82%*	*24.72%*	*0.15%*
2	#Held by Top 10% / others	116/837	86/605	81/574	104/556	179/633	566/3205
	Winners-Cell Average	-0.0012	0.0032	-0.0016	-0.0019	0.0115	0.0033
	P-value	*87.36%*	*78.74%*	*79.21%*	*72.47%*	*6.10%*	*32.36%*
3	#Held by Top 10% / others	259/957	225/932	221/792	309/859	418/935	1432/4475
	Winners-Cell Average	0.0021	0.0052	-0.0044	-0.0004	0.0169	0.0054
	P-value	*62.89%*	*17.36%*	*21.92%*	*89.38%*	*0.00%*	*0.11%*
4	#Held by Top 10% / others	383/673	469/927	402/815	552/1002	753/874	2559/4291
	Winners-Cell Average	0.0021	0.0036	0.0068	0.0089	0.0151	0.0084
	P-value	*60.43%*	*10.82%*	*0.97%*	*0.01%*	*0.00%*	*0.00%*
5 (largest)	#Held by Top 10% / others	328/325	921/953	806/903	1307/1153	977/590	4339/3924
	Winners-Cell Average	0.0033	0.0073	0.0033	0.0013	-0.0005	0.0027
	P-value	*22.41%*	*0.00%*	*0.17%*	*14.65%*	*67.17%*	*0.00%*
All	#Held by Top 10% / others	1125/3311	1718/3708	1523/3366	2286/3782	2356/3414	9008/17581
	Winners-Cell Average	0.0047	0.0058	0.0029	0.0027	0.0087	0.0051
	P-value	*3.27%*	*0.00%*	*0.95%*	*0.28%*	*0.00%*	*0.00%*

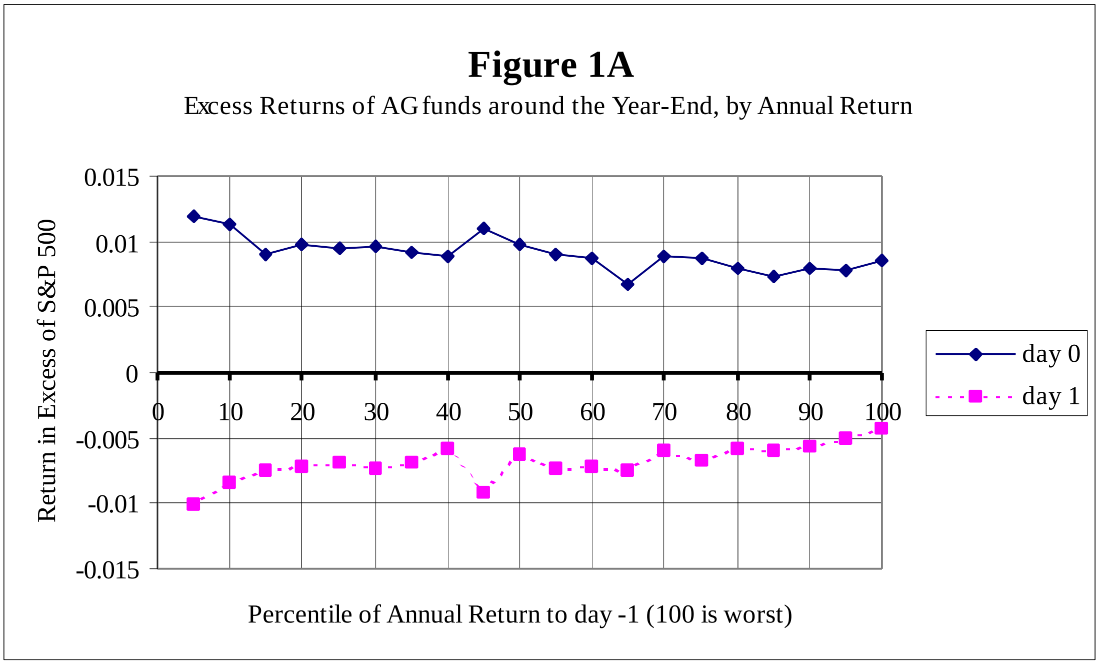
Figure 1A
Excess Returns of AG funds around the Year-End, by Annual Return
Return in Excess of S&P 500
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
0
10
20
30
40
50
60
70
80
90
100
day 0
day 1
Percentile of Annual Return to day -1 (100 is worst)

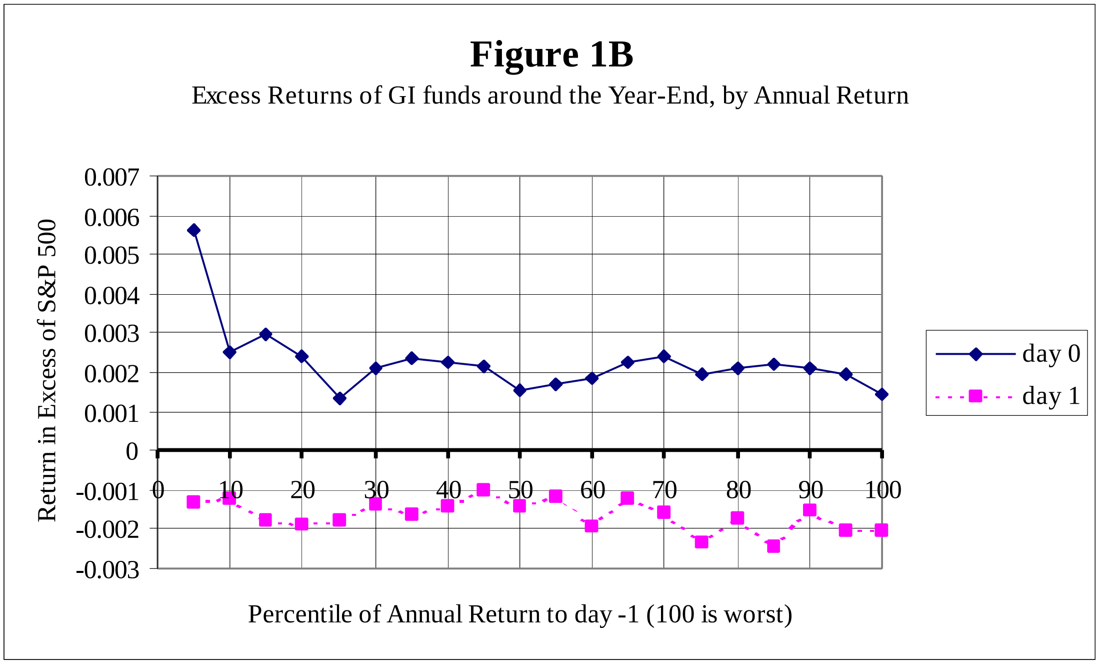
Figure 1B
Excess Returns of GI funds around the Year-End, by Annual Return
Return in Excess of S&P 500
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0
-0.001
-0.002
-0.003
0
10
20
30
40
50
60
70
80
90
100
day 0
day 1
Percentile of Annual Return to day -1 (100 is worst)

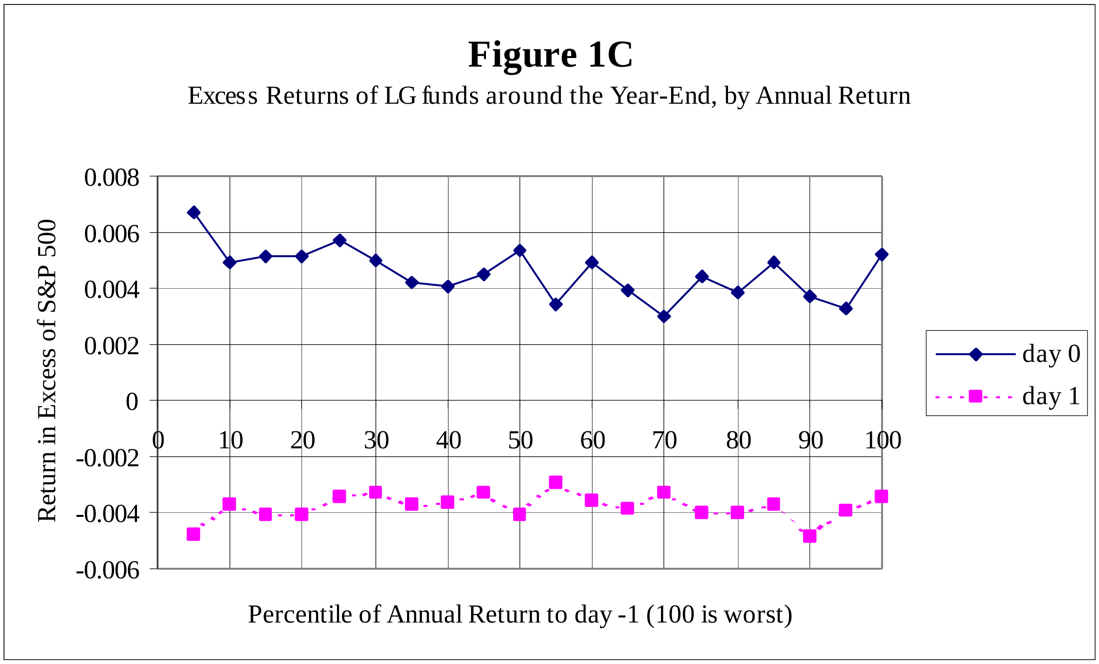
Figure 1C
Excess Returns of LG funds around the Year-End, by Annual Return
Return in Excess of S&P 500
0.008
0.006
0.004
0.002
0
-0.002
-0.004
-0.006
0
10
20
30
40
50
60
70
80
90
100
day 0
day 1
Percentile of Annual Return to day -1 (100 is worst)

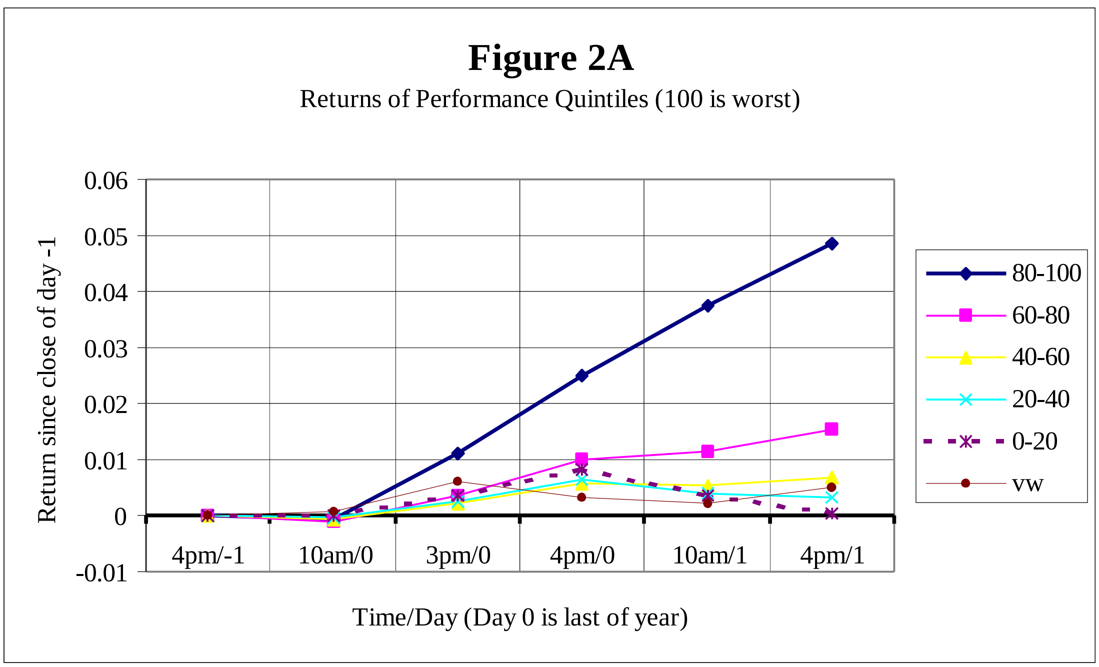
Figure 2A
Returns of Performance Quintiles (100 is worst)
Return since close of day -1
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
4pm/-1
10am/0
3pm/0
4pm/0
10am/1
4pm/1
80-100
60-80
40-60
20-40
0-20
vw
Time/Day (Day 0 is last of year)

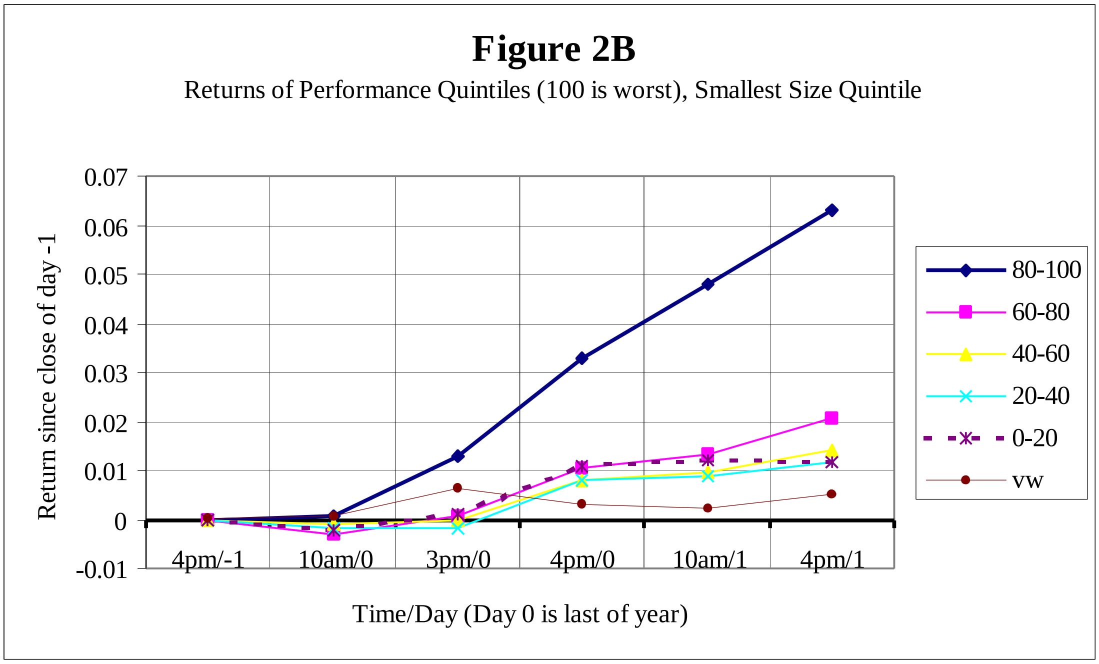

Figure 2B
Returns of Performance Quintiles (100 is worst), Smallest Size Quintile
Return since close of day -1
0.07
0.06
0.05
0.04
0.03
0.02
0.01
0
-0.01
4pm/-1
10am/0
3pm/0
4pm/0
10am/1
4pm/1
Time/Day (Day 0 is last of year)
80-100
60-80
40-60
20-40
0-20
vw

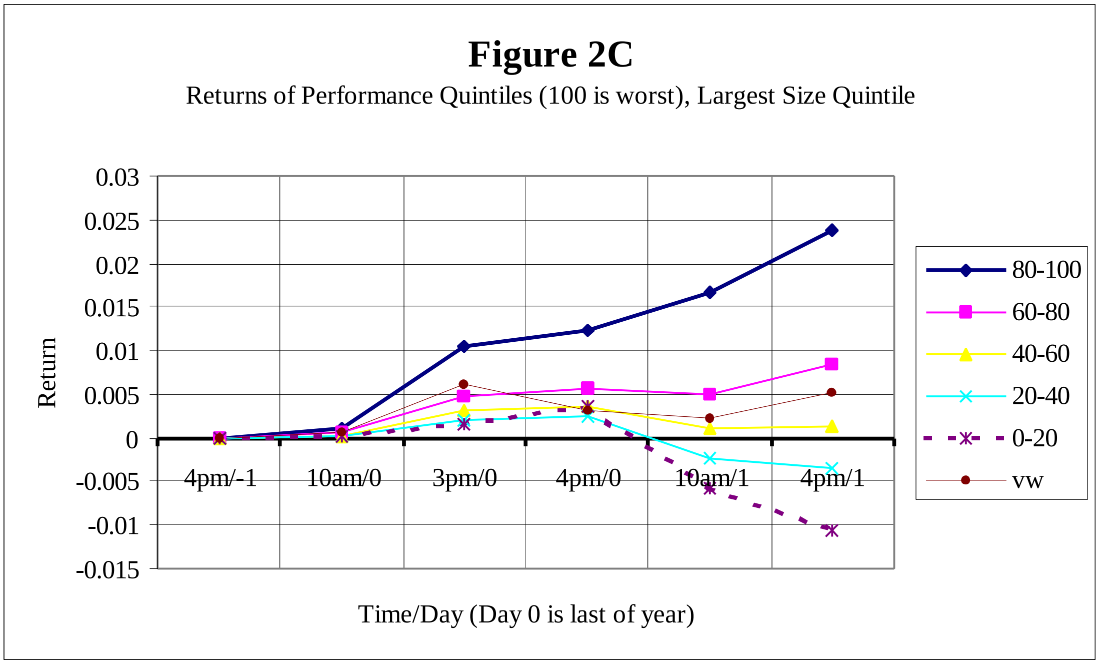

Figure 2C
Returns of Performance Quintiles (100 is worst), Largest Size Quintile
Return
0.03
0.025
0.02
0.015
0.01
0.005
0
-0.005
-0.01
-0.015
4pm/-1
10am/0
3pm/0
4pm/0
10am/1
4pm/1
Time/Day (Day 0 is last of year)
80-100
60-80
40-60
20-40
0-20
vw