

Predicting Mutual Fund Performance: The Win-Loss Record as an Ability Signal

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We hypothesize that there is a low probability for a fund manager to consistently hold many winner stocks unless he has stock picking abilities. We find that the number of stocks contributing to the overall risk-adjusted performance of an actively-managed mutual fund predicts the fund performance very well. A fund that holds a large number of above-median performing stocks in one year generates approximately 2-4% additional risk-adjusted return in the next.

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Are there truly-talented mutual fund managers who consistently generate additional risk-adjusted returns? If yes, how can we identify those managers? Avramov and Wermers (2006) find that among the three investment strategies they form, predictability in manager skills is the dominant source of mutual fund investment profitability. Their results suggest that active management adds significant value and investors would benefit from locating outperforming mutual funds. We hypothesize that a fund manager cannot consistently have a large number of above-median performing stocks in his holdings by chance unless he has stock-picking ability.

In this paper, we use fund holdings data to count the number of stocks that generate above-median risk-adjusted performance. A mutual fund holding can be thought as the repeated draws of stocks to achieve higher risk-adjusted returns. From the large universe of stocks, a fund manager selects the stocks that he believes will increase the risk-adjusted returns of his portfolio. If the manager has no skill, his selections would be similar to random choices. Some of the stocks would have risk-adjusted returns higher than the median, while others would have returns lower than the median. A totally random draw will select approximately one half of above-median performing stocks and another half of below-median performing stocks. If a fund, however, consistently holds a large number of above-median performing stocks, we can conjecture that the fund manager has the ability to pick stocks. It is like having a series of coin tosses with significantly more heads than the tails.

We measure the risk-adjusted returns of each stock in the Center for Research in Security Prices (CRSP) database by regressing daily stock returns on the Carhart (1997) four-factors and estimating its intercept (alpha). We estimate the alpha for each stock using 250 daily returns

representing approximately one year. We compare each stock's alpha with the median alpha for the entirety of the stocks in the CRSP database during the same estimation period and verify whether the stock's alpha is above or below the median. We then tabulate the number of stocks in a mutual fund holding that have alphas above the median, normalizing by the total number of stocks held in the fund. We call this percentage our "win-loss record" as it measures how many above-median performing stocks (winner stocks) the fund manager has selected from the total number of stocks held in the fund.

We find that this win-loss record is predictive of mutual fund performance. High win-loss record funds generate about 2%-4% additional risk-adjusted returns in the subsequent year. This evidence holds robust after accounting for fund size, the number of stocks held in the fund, past fund performance, sample period, and mutual fund fees. Our results suggest that additional information, albeit simple, from mutual fund holdings data provides the predictive power for future fund performance. Our findings would be useful to those who attempt to identify outperforming funds and to others who try to develop a more precise measure of a fund manager's stock-picking ability.

Our work is also related to a growing literature that seeks additional indicators of managerial skill from holdings data and supplements the traditional factor analysis on mutual fund returns. For example, Cohen, Coval, and Pastor (2005), Kacperczyk, Sialm, and Zheng (2005), Kacperczyk and Seru (2007), Cremers and Petajisto (2009), and Petajisto (2013) find some aspects of holdings data can be used to extract additional information about a manager's

skill. We find that these measures in the literature also correlate with our win-loss record indicating that there are more than just a few ways of locating skilled fund managers.

Another branch of the literature attempts to differentiate lucky managers from skilled managers. Kosowski, Timmermann, Wermers, and White (2006), Fama and French (2010), and Barras, Scaillet, and Wermers (2010) use time-series statistical techniques to separate lucky managers from skilled managers. Our work adds to this literature by using statistics from holdings data, which is cross-sectional, to identify good performance that is not likely driven by luck. Fund performance is typically measured from the time-series returns of a fund and fund return data are available only on a monthly basis prior to 2000. Therefore, a researcher has, at most, 36 observations from using three-year monthly data. The lack of a sufficient number of observations limits an accurate measurement of managerial skill using the time-series estimation. Alternatively, the holdings data are reported every quarter or half year and contains information on 83 component stocks, on average. The large number of cross-sectional observations in the holdings data increases the likelihood of successfully differentiating luck-driven performance from performance driven by actual skill.

The rest of this paper is organized as follows. Section I describes the statistical theory that supports our win-loss record measure. Section II explains the data and our empirical methodologies. Section III presents our results, while Section IV summarizes and provides our conclusions.

I. Statistical Theory and Our Win-Loss Record Measure

We begin with a simple assumption that the objective function of mutual fund managers is to increase the risk-adjusted returns of their funds. Note, however, that some funds may have different objective functions, such as generating the most stable possible income. Our focus in this paper is on the actively-managed mutual funds whose objective is to grow the value of the fund after controlling for risk.¹

From the large universe of stocks, fund managers select stocks to be included in their funds. We define the “skilled fund manager” as one who has more than a 50% probability to choose those stocks whose risk-adjusted returns are above the market median risk-adjusted return. Our intuition is as follows. If a fund manager has no stock picking ability, his selection will be a random one. There is 50% probability that a selected stock will have a risk-adjusted return higher than the market median risk-adjusted return. Alternatively, a manager with true stock-picking ability should exhibit a probability significantly higher than 50%. This manager will consistently choose several stocks with risk-adjusted returns higher than the market median risk-adjusted return for his portfolio.

We assume the current fund holding is the result of the fund manager’s repeated picks. Using our definition of a skilled manager, we conduct a statistical test of fund holdings to see whether a fund manager has true stock picking ability. We set the null hypothesis as a fund manager has a 50% chance to select a stock with a risk-adjusted return higher than market median risk-adjusted return:

¹ Fund managers may also try to maximize their own personal objective functions. Such an agency problem is beyond the scope of this paper. We still assume that agency problems for actively-managed mutual funds are not substantially different from those for other fund types.

$$H_0: p = 0.5$$

Under the null hypothesis, we can use the binomial distribution to compute the probability of acquiring currently realized stock picks (i.e., current holdings). Of n stocks, the probability of having k stocks with risk-adjusted returns above market-median risk-adjusted return is:

$$\Pr(K = k) = \binom{n}{k} \cdot p^k (1 - p)^{n-k} = \binom{n}{k} \cdot \frac{1^k}{2} \left(\frac{1}{2}\right)^{n-k} = \binom{n}{k} \cdot \left(\frac{1}{2}\right)^n, \quad (1)$$

where:

$$\binom{n}{k} = \frac{n!}{k! (n - k)!}$$

Note that k is the number of stocks with above-median risk-adjusted returns and n is the number of stocks held in the fund.

Equation (1) has the largest value when $k = n/2$. The value gets smaller when k gets closer to n or zero. For example, suppose there is a fund manager who has 50 stocks in his portfolio. If 30 of those stocks have risk-adjusted returns above the market median, the probability that this fund manager is an unskilled one ($H_0: P = 0.5$) is:

$$\Pr(K = 30) = \binom{50}{30} \cdot \left(\frac{1}{2}\right)^{50} = 4.19\%$$

If all 50 stocks have risk-adjusted returns above the market median, the probability that this fund manager is an unskilled one ($H_0: P = 0.5$) is:

$$\Pr(K = 50) = \binom{50}{50} \cdot \left(\frac{1}{2}\right)^{50} \approx 0.00\%$$

Equation (1) indicates that if a fund manager has a larger number of stocks with risk-adjusted returns higher than the market median, there is a low probability that this manager has achieved such outperformance by chance. Therefore, we arrive at the conclusion that when a manager selects more stocks with above-median risk-adjusted returns, there is a low probability that this manager is unskilled. Since we are only interested in identifying fund managers with stock-picking ability (a probability higher than 50%), we must determine how many stocks out of n have risk-adjusted returns above the market median (i.e., how close k is to n).

Thus, we tabulate the number of stocks in a portfolio with above-median risk-adjusted returns (k) and normalize it by the total number of stocks (n) in the portfolio. Our indicator is k/n and can be acquired from holdings data.

$$m_1 = k/n \tag{2}$$

We admit that this indicator is a very simple one with limitations. This measure only counts the number of stocks that have better risk-adjusted performance than the market median. We can modify the m_1 measure by incorporating additional controls. For example, we can add different weights to each stock. We can also redefine the skilled fund manager as one who has more than a 90%, instead of a 50%, probability to select stocks whose risk-adjusted returns are above the market median risk-adjusted return. We find that such measure(s) with additional control(s) have over an 80% Pearson correlation(s) with m_1 suggesting that additional controls wouldn't significantly change the empirical results.² In fact, for measures with additional controls, we acquire qualitatively similar results. Consequently, we use m_1 for most of our empirical tests as our win-loss record measure.

Unless the fund manager changes component stocks in the portfolio right before releasing a holdings report, the win-loss record from its past holdings report contains information concerning how many above-median performing stocks the manager selected in the past.³ If a manager has chosen many above-median performing stocks owing to his superior skill, it is likely that the fund performance will continue to be good.

² The weight seems to be of little importance as fund managers are typically not allowed to invest large sums in just a few stocks. Informal interviews with fund managers indicate that, typically, the fund's risk management department requires fund managers to distribute investments broadly across component stocks. These interviews also taught us that fund managers try to select seemingly good stocks, but they usually do not attempt to guess how good the performance of individual stocks will be. Outcomes of these interviews strongly support the use of our measure of managerial skill, m_1 , for our empirical tests.

³ Kacperczyk, Sialm, and Zheng (2008) indicate that returns from the holdings report are not much different from the actual fund holdings suggesting that holdings data can serve as a fair record of the overall past performance of a fund manager.

II. Data and Methodology

We use the Thomson Financials Mutual Fund Stock Holdings Data from January 1, 1982-December 31, 2008. To measure the subsequent one-year returns from the point of holdings data release, we acquire monthly fund returns data from the CRSP Mutual Fund Data and daily stock returns from the CRSP Stock Returns Data from January 1, 1983-December 31, 2009. We use the Mutual Fund Link Data to merge the Thomson Data with the CRSP Mutual Fund Data. We examine only actively-managed equity mutual funds whose main goal is to maximize risk-adjusted return. In the Thomson Data, we select funds that have an Investment Objective Code of 2 or 3. Objective Code 2 represents aggressive growth, while Objective Code 3 signifies growth. Likewise, we use fund information from the CRSP data to remove funds that are not actively managed or not equity-based, such as index funds, money market funds, or bond funds. We follow the criteria in Kacperczyk, Sialm, and Zheng (2008) to filter out actively-managed mutual funds. After the filtering, we have a total of 1,530 actively-managed equity mutual funds remaining in our sample. Each fund has, on average, 24 holdings reports during the sample period.

We first run the Carhart (1997) four-factor model to estimate the risk-adjusted performance of individual stocks. The risk-adjusted performance of a stock is measured by the intercept (alpha) of the following four-factor model:

$$r_i - r_f = \alpha_i + \beta \cdot (r_m - r_f) + \delta \cdot SMB + \phi \cdot HML + \gamma \cdot UMD + \varepsilon, \quad (3)$$

where r_i is the return on stock i , r_f is the risk-free interest rate, r_m is the return on the stock market, SMB is the small-minus-big size factor, HML is the high-minus-low book-to-market factor, and UMB is the up-minus-down momentum factor. All observations are on a daily basis. The CRSP Stock Returns Data provide the daily returns of stocks listed in major U.S. stock exchanges. Daily asset-pricing factors are acquired from the data library website of Ken French. We estimate the alphas of all stocks in the CRSP database using a 250 business day estimation period, which is approximately one full year.⁴

After we acquire the alpha of each individual stock, we determine whether the stock's alpha is higher than the median alpha of all of the stocks in the CRSP Stock Returns Data during the same estimation period (previous 250 days). The stocks that have alphas above the median alpha are above-median-performing (winner) stocks, while the others are below-median-performing (loser) stocks. We calculate our performance measure of a fund holding, m_f , with the number of above-median-performing stocks divided by the total number of stocks in the fund. When m_f is high, we describe this fund as a "high win-loss record" fund as high m_f indicates that the manager selected many above-median performing stocks. Figure 1 illustrates our estimation period and prediction period.

Insert Figure 1 About Here

⁴ Note that we obtain similar results with different estimation periods. When the estimation period is longer, alpha becomes more accurate, but there can be considerable overlapping between the alpha estimation period and the prediction period. We also estimate alphas using monthly returns, but due to a small number of observations per year (12), the estimated alpha is not reliable.

Since the average value of m_I for the entire sample of mutual funds changes over time, we compare a fund's win-loss measure (m_I) with those of other actively-managed equity mutual funds. We track back one year from a mutual fund holdings report and rank the m_I of a fund by comparing it with other funds' win-loss records. If a holdings report is reported on July 31, 2005, for example, we compare the win-loss record of the fund with the win-loss records of other funds from July 31, 2004-July 31, 2005. We then rank the win-loss records into quintiles. A drawback of this method is that the sample size used for comparison may vary over time, especially when the reports of fund holdings are clustered in particular calendar months. We also tried a cruder sorting, such as ranking by every calendar year, and actually got stronger results. However, sorting by calendar year creates a look-back bias. Comparing a holdings report acquired in March with a holdings report acquired in June of the same year is not realistic. In a later section, we test to determine whether investors can use our win-loss record measure to achieve significantly higher risk-adjusted returns. Sorting by calendar year would not allow us to do so. Figure 2 illustrates this comparison process.

Insert Figure 2 About Here

Next, subsequent one-year fund returns from the release of a holdings report are measured in four different ways. First, we calculate fund alphas using the Carhart (1997) four-factor model. There are only 12 observations per year if we use monthly fund returns data. Therefore, the estimation would be subject to large errors. Alternatively, including more past

time-series observations will create an overlap between the win-loss record calculation period and the performance measurement period. For these reasons, we use the daily returns of the stocks in the holdings data and take the weighted averages of these returns every day using immediate past holdings as their weights. This process is equivalent to mimicking a fund return with the use of the holdings data. Kacperczyk et al. (2008) find that these replicated returns are very similar to fund returns in the CRSP mutual fund database (e.g., with only one basis point difference in the monthly returns). We track one-year subsequent daily fund returns from the point of a holding report, and we estimate the Carhart (1997) four-factor alpha from this daily return series.⁵

Next, we calculate the benchmark-adjusted return of each stock. Every month, Daniel, Grinblatt, Titman, and Wermers' (1997) risk-adjusted return is calculated by subtracting size, book-to-market, and momentum benchmark returns from a stock's return. A fund's benchmark-adjusted return is the weighted average of individual stocks' benchmark-adjusted returns (see Daniel et al., 1997 or Wermers, 2004 for details of this measure).⁶ We refer to this return as the DGTW benchmark-adjusted return.

Additionally, following the method outlined in Kacperczyk et al. (2008), we construct the monthly holdings-based return, which tracks stock returns based on the latest fund holdings. Finally, we report monthly, fee-adjusted returns from the CRSP mutual fund database. Note that

⁵ We also tried another aggregation method, estimating stock alphas separately and aggregating them by holdings data. Elton et al. (2011) document that this method is equivalent to estimating alphas from portfolio returns. We obtain qualitatively similar results from this alternative method.

⁶ DGTW benchmarks are available via <http://www.smith.umd.edu/faculty/rwermers/ftpsite/Dgtw/coverpage.htm>.

among these four measures, the first two return measures are adjusted for risk and the last two measures are not.

Insert Table 1 About Here

Table 1 provides a summary statistic of our sample. Panel A reports the pooled sample summary statistics, while Panel B presents the summary statistics by win-loss record quintiles. Panel B indicates that Win-Loss Quintile 3, the middle group, has a win-loss record of about 50%. Meanwhile, Win-Loss Quintile 5, the highest win-loss record group, has an average win-loss record of 75.8%. Unskilled fund managers would not achieve such a high win-loss record by chance.

III. Results

A. Predictive Power of Our Win-Loss Record Measure

First, we examine whether our win-loss record measure can predict additional risk-adjusted fund returns. In this section, we calculate subsequent fund returns for our win-loss record ranks to determine whether there is a significant difference across those ranks. Table 2 reports one-year subsequent returns from the position of the win-loss record ranking formation.

We calculate the equal-weighted average within a win-loss record quintile, but our results do not change by switching to the value-weighted average.⁷ All average returns are in monthly scale.

Insert Table 2 About Here

Table 2 demonstrates that high win-loss record funds produce better returns in the subsequent year. The differences in the risk-adjusted returns (alpha and DGTW benchmark-adjusted returns) are 0.19% and 0.36% per month, equivalent to 2% and 4% per year, respectively. The difference is largely driven by particularly high risk-adjusted returns for the highest win-loss record ranks (Win-Loss Quintile 5). This result is consistent with the statistical intuition we rely on. According to the binomial probability structure in Section I, the probability of having k above-median performing stocks of n total stocks is:

$$\Pr(K = k) = \binom{n}{k} \cdot p^k (1 - p)^{n-k} = \binom{n}{k} \cdot \frac{1}{2}^k \left(\frac{1}{2}\right)^{n-k} = \binom{n}{k} \cdot \left(\frac{1}{2}\right)^n \quad (1)$$

Note that the probability in Equation (1) does not linearly increase or decrease because the term:

$$\binom{n}{k} = \frac{n!}{k! (n - k)!}$$

⁷ For visual convenience, we center the returns to zero by subtracting the average return of the whole sample. Thus, the centered returns have zero mean if we use the average of all of the returns in the sample.

increases or decreases exponentially by a change in k . In other words, the probability is not very different when k is near $n/2$, but the probability quickly reaches close to zero as k approaches n . Thus, it is relatively easy, in probability, to move between Quintiles 2-4, but it is very difficult to be in Quintile 5 (highest). As a result, the highest win-loss record quintile contains many of the funds that have k near n , which is a much stronger indication of managerial skill (stock-picking ability).

We observe that some of the returns (not risk-adjusted) are higher in Win-Loss Quintile 1 (lowest win-loss record quintile) as compared to the middle ranks. These raw returns can be higher as there may be some funds in Quintile 1 that intentionally aim at one or two seemingly large return stocks. Funds that act like venture capital may seek one or two “homerun” stocks instead of trying to fill their portfolios with many above-median performing stocks. If those “sluggers” persistently produce superior returns, the fund managers probably possess a different but valuable skill. Admittedly, our win-loss record measure would not capture this type of skill. Nonetheless, Quintile 1’s risk-adjusted returns are the lowest, on average, suggesting that there are not that many funds in this group that enjoy sufficient rewards for their risk.

B. Other Fund Characteristics and Our Win-Loss Record Measure

It can be relatively easier for smaller funds to have higher win-loss record measures as the measure’s denominator is the total number of stocks in a fund. Therefore, one can argue that our results may convey that smaller funds are performing better than larger funds. However, it is not necessarily true that the number of stocks is monotonically increasing with fund size. When a

certain degree of diversification is reached, managers may restrict the number of stocks to a level they can manage. The number of stocks may also vary by fund characteristic. A fund benchmarking the S&P 100 index may be larger in size, but may contain fewer stocks when compared to a fund benchmarking the Russell 3000.

We do a double-sorting, ranking by fund asset-size quintiles, and then by win-loss-record quintiles to see if our win-loss record measure only captures the size effect. This yields 25 (5x5) clusters. Equal-weighted, subsequent one-year returns are calculated for each cluster.

Insert Table 3 About Here

Table 3 indicates that high win-loss record funds generate higher risk-adjusted returns regardless of the fund size.⁸ We don't observe particularly better results in the smallest size quintile suggesting that fund size is not driving our main result.

Next, we determine whether our win-loss record measure provides additional information to the "traditional" fund performance measure. Following Kacperczyk and Seru (2007) and Elton, Gruber, and Blake (2011), the fund alpha is estimated from monthly fund returns for the previous 36 months using the Carhart (1997) four-factor model. We sort the sample funds by this traditional alpha and then by our win-loss record. We track one-year subsequent returns from the point of sorting. If the explanatory power of our win-loss record measure is highly correlated

⁸ We also do another double sorting, ranking by the number of stocks held in the fund quintiles and then by win-loss-record quintiles. The results are similar. High win-loss record funds generate higher risk-adjusted returns regardless as to the number of stocks held in the fund. The results are available upon request.

with that of the traditional alpha, we would not observe differences in risk-adjusted returns after this double sort. This result would indicate that our measure does not add significantly important information to the traditional fund performance measure.

Insert Table 4 About Here

Table 4 demonstrates that our main results hold across different past performance quintiles. Thus, our measure adds more information about future risk-adjusted performances to the traditional fund performance measure. This result is particularly strong for funds that did better in the past (Performance Quintile 5). This evidence strongly supports the theory that the win-loss records of mutual funds are an important indicator of managerial skill.

The implication from this particular evidence is similar to that of the jump of fund performance in the highest win-loss record quintile. If a manager has skill, his past performance, measured by the traditional alpha, would also be likely to be higher than the others. Thus, in the lower past performance Quintiles 1-4, there would be fewer skilled managers. It will be difficult to statistically identify skilled managers from these quintiles as the number of skilled managers is small when compared to the number of observations in each quintile resulting in a low signal-to-noise ratio. The situation is different for funds that did very well in the past as there are many skilled managers in this highest past performance quintile. A statistical method would produce significantly stronger results as there would be many skilled fund managers in this quintile resulting in a high signal-to-noise ratio. Therefore, if our measure identifies skilled managers, it

is not surprising to note its greatest predictive power among those funds that performed better in the past. As such, our measure should be useful in identifying temporary superior fund performance driven by luck, not skill.

Another important implication from Table 4 is warranted. The strong predictive power of our win-loss record measure for the good or best performing funds suggests that our earlier results in Table 2 are not driven by survivorship bias. Such a bias would typically apply to poorly performing funds as these funds are more likely to vanish.

Finally, we divide our sample period in two to determine whether our results are a time-specific phenomenon. The first sample period is from January 1982-December 1994, while the second sample period is from January 1995-December 2008.

Insert Table 5 About Here

Table 5 indicates that in both subsample periods, high win-loss record funds produce better risk-adjusted returns. The table confirms that our earlier results are not a time-specific phenomenon. Note that for the more recent subsample period, we find that some of the non-risk-adjusted returns are high in Win-Loss Quintile 1 (lowest win-loss record). This result may be caused by some funds that achieved very high fund returns by successfully investing in one or two homerun stocks (e.g., Google in the 1990s). When only the portfolio returns of these funds are analyzed, the portfolio returns look better than others because one or two homerun stocks raised the mean portfolio return dramatically. However, it is difficult to statistically distinguish

whether a manager selected the homerun stock(s) by skill or by chance. From an investor's point of view, when he has little information about each fund manager, it is risky to choose a fund from the low win-loss record group, even though its raw return appears high, as there is a greater chance of false discovery (e.g., identifying an unskilled manager as a skilled one). Fama and French (2010) and Barras et al. (2010) determine that this false discovery problem is severe in mutual fund selection. Moreover, the overall risk-adjusted return of this group is low indicating that it is, on average, a better idea for investors to select from high win-loss record funds.

C. Alternative Measures of Win-Loss Record

Thus far, we have used the above-median performance as the criterion of good performance, but the line does not have to be drawn at the 50th percentile. Recall that holdings data can be thought of as repeated draws on stocks and the line can be drawn at other, higher percentiles. It is even more difficult for a manager to have many stocks above the higher percentile by chance. Alternatively, if our measure is merely capturing a specific (unknown) factor related to the median, the change in the percentile as the criteria would eliminate the predictive power of the win-loss record measure. In this section, we use the upper 75th percentile as the bar and calculate the number of stocks above this level. There is a trade-off in raising the bar too high (e.g., the 99th percentile) as there would be few stocks in each fund that are above such an extremely high criteria.

We tabulate the number of stocks that are above 75th percentile in each fund and normalize this figure by the total number of stocks in the fund. Then, we rank by this alternative

win-loss record measure quintile and report the one-year subsequent returns. The results are reported in Table 6.

Insert Table 6 About Here

We detect a similar pattern to our earlier results using the 50th percentile as the criteria. High win-loss record funds, measured by the 75th percentile cutoff point, have higher risk-adjusted returns. The magnitude of the differences from the low win-loss record funds is also similar to that in Table 2 that uses the 50th percentile or median as the cutoff criteria. Thus, our win-loss record measure is not sensitive to the cutoff point.

D. Fund Expenses/Fees and Our Win-Loss Record Measure

If investors believe that some fund managers have good stock-picking ability, the fund sellers may charge higher fees to investors. In other words, a fund seller can extract rent from investors when investors are lured by some signals (such as reputation) from the fund manager. In an extreme case, the seller may increase the fees to a level such that the net return of a renowned fund is the same as the net returns of other funds.⁹ In this subsection, we examine the relationship between our win-loss record measure and mutual fund fees. To measure the size of the fees, we use the expense ratio and management fees acquired from the CRSP mutual fund

⁹ This type of rent-seeking behavior would be stronger for hedge funds, which are not regulated and face less competition from each other.

database. Since expense ratio data are annual data, we capture an annual average of our win-loss records and merge them with the expense ratio data.

Insert Table 7 About Here

Table 7 reports the expense ratios and management fees by win-loss record quintiles. These fees are reported in annual scale, as a percentage of fund assets. We see a slight increase in mutual fund fees as we move toward higher win-loss record funds. However, the difference is about 0.1% per year, which is a fraction of the additional risk-adjusted returns generated by high win-loss record funds. Note that we observe approximately 2%-4% additional annual risk-adjusted returns in Table 2 for high win-loss record funds. This result suggests that fees in practice are not fully adjusted for our measure of the fund manager's stock-picking ability. We also verify whether the after-fee fund returns from the CRSP mutual fund database differ from returns before fees. The two returns share almost identical variations as documented in Kacperczyk et al. (2008). Our results are also consistent with Bailey, Kumar, and Ng (2011) who find that fund investors have substantial behavioral biases in fund selections. These results are not consistent, however, with the rational expectation model of Berk and Green (2004). Perhaps financial institutions do not charge differential fees when investors do not distinguish luck from actual stock-picking ability.

E. Other Fund Performance Predictors and Our Win-Loss Record Measure

In this subsection, we compare our win-loss record measure with other mutual fund performance predictors. There can be more than one way to identify skilled managers as skill may be related to various other underlying characteristics of a fund. Therefore, the signals of managerial skill can take multiple forms. There are several skill indicators documented in the literature. If our measure actually captures the underlying fund manager's skills, it would be also be related to the other skill indicators.

We select mutual fund performance indicators that can be readily derived from our sample. Kacperczyk et al. (2005) find that high industry concentration of a fund is a predictor of the future performance. They determine how concentrated a fund is on a specific industry and develop a measure called the Industry Concentration Index (ICI). Cremers and Petajisto (2009) and Petajisto (2013) define Active Shares Ratio as a measure of the deviation of a fund holding from various stock market indices. They find that high Active Shares Ratio is linked to better performance. Kacperczyk et al. (2008) introduce Return Gap, the difference between realized fund returns and holdings-based returns. They demonstrate that Return Gap is positively correlated with future performance.

The ICI measure can be calculated from Thomson Mutual Fund Holdings Data, and we follow the industry definitions in Kacperczyk et al. (2005). Active Share Ratio data is directly downloaded from Dr. Antti Petajisto's website: www.petajisto.net/data/html. Return Gap is obtained by subtracting holding-based returns from realized returns, used in earlier tables in this paper. We sort our funds by our win-loss record quintile, and then compute the averages of other performance indicators for each quintile. Table 8 reports the results.

Insert Table 8 About Here

Win-Loss Quintile 5, the highest win-loss record funds, has the highest ICI, the highest Active Share Ratio, and the highest Return Gap. Such strong correlations with other indicators of performance suggest that our win-loss record measure is another way of capturing managerial skill. Still, the relation between other indicators and our measure is not completely monotonic suggesting that our measure is not a mere reflection of those other indicators. The magnitude of the indicators is rather similar across the Quintiles 1-4, while there is a considerable jump in Quintile 5. As we argue in the previous sections, most of the skilled managers would be in this quintile and, as a result, other skill indicators (ICI, Active Share Ratio, and Return Gap) would be most prominent as well.

IV. Summary and Conclusions

We develop a win-loss record measure of fund manager skill by computing the number of above-median performing stocks in each mutual fund holdings report. Our logic is that a fund holding can be thought as repeated draws of stocks to achieve higher risk-adjusted returns in the portfolio level, and it is not likely for fund managers to choose many above-median performing stocks in fund holdings by chance.

We find that our win-loss record measure predicts future fund performance very well. Mutual funds with higher win-loss records earn higher risk-adjusted returns, measured by the

Carhart (1997) four-factor model alpha or Daniel et al.'s (1997) benchmark-adjusted returns. Our measure is free from look-back bias. As such, a relatively uninformed investor can use our measure to identify skilled fund managers. Our results are not driven by fund size or survivorship bias, and our win-loss record measure predicts variations in future fund returns that are not fully captured by traditional fund performance measures. We also find that our results hold throughout the sample period indicating that they are not a time-specific phenomenon. Our measure is correlated with other indicators of future fund performances demonstrating that it is another type of signal that skilled fund managers may generate.

In addition to its prediction capability, an advantage of our measure is that it is based on a different type of information, compared to the traditionally-used, past fund returns data. Fama and French (2010) and Barras et al. (2010) determine that even with a long series of fund returns data, it is difficult to identify skilled fund managers. Different data, such as holdings reports, can provide important information missing in the past fund returns data. Hopefully, our research sheds additional light on the noisy process of detecting the true stock-picking ability of mutual fund managers. French (2008), for example, finds that investors spend 0.67% of the aggregate value of the market each year searching for superior returns.

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Table 1.
Summary Statistics

Our sample includes domestic equity mutual funds in the Thomson Financials Mutual Fund Stock Holdings Data for January 1, 1982-December 31, 2008. We include only actively-managed equity mutual funds following the definition of Kacperczyk et al. (2008). The total number of mutual funds in our sample is 1,530. Panel A reports the summary statistics of all pooled observations, while Panel B presents the summary statistics by our win-loss record quintile.

Panel A: All Funds in the Sample

	Mean	Median	Standard Deviation
Number of holdings report available per mutual fund	24.5 reports	24 reports	14.3 reports
Number of stocks in a fund holding	83 stocks	60 stocks	90 stocks
Percentage of stock holdings (individual stock's market value aggregated / end of quarter assets)	99%	100%	6%
Fund total assets at the end of quarter (million \$)	\$1,138 mil.	\$228 mil.	\$4,466 mil.
Win-Loss record (number of above-median performing stocks / total number of stocks held)	52.9%	52.4%	18.0%

Panel B: Funds by Our Win-Loss Record Quintiles

Win-Loss Quintile 1 (Lowest)	Mean	Median	Standard Deviation
Number of holdings report available per mutual fund	23.8 reports	23 reports	14.9 reports
Number of stocks in a fund holding	64 stocks	46 stocks	70 stocks
Percentage of stock holdings (individual stock's market value aggregated / end of quarter assets)	98%	100%	8%
Fund total assets at the end of quarter (million \$)	\$870 mil.	\$171 mil.	\$3,305 mil.
Previous 12-month realized fund return, after fees (monthly average return)	0.95%	1.07%	1.46%
Win-Loss record (Number of above-median performing stocks / Total number of stocks held)	28.5%	28.6%	9.1%

Win-Loss Quintile 2 (Low)	Mean	Median	Standard Deviation
Number of holdings report available per mutual fund	24.2 reports	24 reports	14.5 reports
Number of stocks in a fund holding	88 stocks	60 stocks	100 stocks
Percentage of stock holdings (individual stock's market value aggregated / end of quarter assets)	99%	100%	6%
Fund total assets at the end of quarter (million \$)	\$1,278 mil.	\$248 mil.	\$5,107 mil.
Previous 12-month realized fund return, after fees (monthly average return)	0.95%	1.08%	1.59%
Win-Loss record (number of above-median performing stocks / total number of stocks held)	41.5%	41.5%	7.7%

Win-Loss Quintile 3 (Mid)	Mean	Median	Standard Deviation
Number of holdings report available per mutual fund	24.5 reports	24 reports	14.1 reports
Number of stocks in a fund holding	97 stocks	64 stocks	119 stocks
Percentage of stock holdings (individual stock's market value aggregated / end of quarter assets)	99%	100%	6%
Fund total assets at the end of quarter (million \$)	\$1,340 mil.	\$258 mil.	\$5,780 mil.
Previous 12-month realized fund return, after fees (monthly average return)	0.85%	1.02%	1.66%
Win-Loss record (number of above-median performing stocks / total number of stocks held)	50.6%	50.0%	7.8%

Win-Loss Quintile 4 (High)	Mean	Median	Standard Deviation
Number of holdings report available per mutual fund	24.6 reports	24 reports	14.1 reports
Number of stocks in a fund holding	89 stocks	64 stocks	89 stocks
Percentage of stock holdings (individual stock's market value aggregated / end of quarter assets)	99%	100%	5%
Fund total assets at the end of quarter (million \$)	\$1,212 mil.	\$257 mil.	\$4,089 mil.
Previous 12-month realized fund return, after fees (monthly average return)	0.93%	1.04%	1.78%
Win-Loss record (number of above-median performing stocks / Total number of stocks held)	60.1%	59.7%	7.7%

Win-Loss Quintile 5 (Highest)	Mean	Median	Standard Deviation
Number of holdings report available per mutual fund	25.4 reports	25 reports	14.2 reports
Number of stocks in a fund holding	74 stocks	62 stocks	52 stocks
Percentage of stock holdings (individual stock's market value aggregated / end of quarter assets)	99%	100%	6%
Fund total assets at the end of quarter (million \$)	\$962 mil.	\$210 mil.	\$3,504 mil.
Previous 12-month realized fund return, after fees (monthly average return)	1.15%	1.10%	2.26%
Win-Loss record (number of above-median performing stocks / total number of stocks held)	75.8%	75.3%	9.8%

Table 2.**Subsequent-Year Performances of Sample Mutual Funds Sorted by Our Win-Loss Record Measure**

We calculate our win-loss record for each mutual fund holdings report by dividing the number of stocks in the fund with above-median risk-adjusted returns by the total number of stocks held in the fund. We rank sample mutual funds into quintiles by comparing with other holdings reports released during the same previous one-year period. Then, we track subsequent one-year returns from the day of the holdings release. Since our sample of the holdings data is from January 1, 1982-December 31, 2008, subsequent one-year fund returns data are from January 1, 1983-December 31, 2009. All returns are in monthly scale. Standard errors of the difference between returns for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

Note that we measure subsequent one-year fund returns in four different ways. First, we calculate fund alphas from the daily return series using the Carhart (1997) four-factor model. Additionally, we compute the benchmark-adjusted return of each stock every month. Daniel et al.'s (1997) benchmark-adjusted return is calculated by subtracting size, book-to-market, and momentum benchmark returns from a stock's return. A fund's benchmark-adjusted return is the weighted average of an individual stock's benchmark-adjusted returns. Next, we construct the monthly holdings-based return, which tracks stock returns based on the latest fund holdings (see Kacperczyk et al., 2008 for details). Finally, we obtain monthly, fee-adjusted returns from the CRSP mutual fund database.

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings- Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.10%	0.27%	0.15%	0.16%
Win-Loss Quintile 4	0.02%	0.00%	-0.07%	-0.05%
Win-Loss Quintile 3	-0.02%	-0.07%	-0.08%	-0.09%
Win-Loss Quintile 2	-0.03%	-0.09%	-0.02%	-0.03%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.09%	-0.09%	0.05%	0.03%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.19%* (0.01%)	0.36%* (0.04%)	0.10%* (0.03%)	0.13%* (0.03%)

Table 3.
Subsequent-Year Performances of Sample Mutual Funds Sorted by Fund Size and Our Win-Loss Record Measure

First, we rank mutual funds by their asset size (quintiles) and then rank by our win-loss record measure (quintiles). We calculate our win-loss record for each mutual fund holdings report by dividing the number of stocks in the fund with above-median risk-adjusted returns by the total number of stocks held in the fund. This process produces 25 (5x5) clusters. Then, we track subsequent one-year returns from the day of the holdings release. Since our sample of the holdings data is from January 1, 1982-December 31, 2008, subsequent one-year fund returns data are from January 1, 1983-December 31, 2009. All returns are in monthly scale. Standard errors of the difference between returns for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

Note that we measure subsequent one-year fund returns in four different ways. First, we calculate fund alphas from the daily return series using the Carhart (1997) four-factor model. Additionally, we calculate the benchmark-adjusted return of each stock every month. Daniel et al.'s (1997) benchmark-adjusted return is calculated by subtracting size, book-to-market, and momentum benchmark returns from a stock's return. A fund's benchmark-adjusted return is the weighted average of an individual stock's benchmark-adjusted returns. Next, we construct the monthly holdings-based return, which tracks stock returns based on the latest fund holdings (see Kacperczyk et al., 2008 for details). Finally, we obtain monthly, fee-adjusted returns from the CRSP mutual fund database.

Size Quintile 1 (Smallest)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.09%	0.15%	0.24%	0.32%
Win-Loss Quintile 4	0.01%	-0.08%	-0.10%	-0.13%
Win-Loss Quintile 3	-0.14%	0.02%	0.04%	-0.01%
Win-Loss Quintile 2	0.00%	-0.06%	-0.05%	-0.09%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.07%	0.03%	0.06%	0.00%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.16%* (0.04%)	0.12% (0.09%)	0.18% (0.10%)	0.32%* (0.10%)

Size Quintile 2 (Small)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.06%	0.24%	0.35%	0.39%
Win-Loss Quintile 4	0.03%	0.17%	0.12%	0.14%
Win-Loss Quintile 3	0.01%	-0.03%	0.01%	-0.02%
Win-Loss Quintile 2	-0.05%	-0.03%	0.09%	0.10%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.11%	-0.10%	0.07%	0.06%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.17%* (0.03%)	0.34%* (0.09%)	0.28%* (0.08%)	0.33%* (0.08%)

Size Quintile 3 (Mid)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.07%	0.23%	0.29%	0.28%
Win-Loss Quintile 4	-0.00%	-0.02%	-0.03%	0.01%
Win-Loss Quintile 3	-0.03%	-0.10%	-0.01%	-0.01%
Win-Loss Quintile 2	-0.01%	-0.10%	0.02%	-0.01%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.07%	-0.14%	0.05%	0.02%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.14%* (0.03%)	0.37%* (0.10%)	0.24%* (0.08%)	0.26%* (0.07%)

Size Quintile 4 (Large)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.11%	0.35%	0.18%	0.16%
Win-Loss Quintile 4	0.00%	0.02%	-0.10%	-0.06%
Win-Loss Quintile 3	-0.03%	-0.07%	-0.08%	-0.08%
Win-Loss Quintile 2	-0.05%	-0.15%	-0.05%	-0.05%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.07%	-0.12%	0.06%	0.04%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.18%* (0.03%)	0.47%* (0.10%)	0.12% (0.07%)	0.12% (0.07%)

Size Quintile 5 (Largest)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.14%	0.28%	-0.15%	-0.16%
Win-Loss Quintile 4	0.04%	-0.00%	-0.15%	-0.16%
Win-Loss Quintile 3	-0.02%	-0.14%	-0.14%	-0.14%
Win-Loss Quintile 2	-0.04%	-0.11%	-0.13%	-0.13%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.11%	-0.12%	-0.01%	-0.01%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.25%* (0.02%)	0.41%* (0.10%)	-0.14% (0.06%)	-0.15% (0.06%)

Table 4.
Subsequent-Year Performances of Sample Mutual Funds Sorted by Past Performance and Our Win-Loss Record Measure

First, we rank mutual funds by alphas estimated from the Carhart (1997) four-factor model with their monthly fund returns during the previous 36 months and then rank by our win-loss record (quintiles). We calculate our win-loss record measure for each mutual fund holdings report by dividing the number of stocks in the fund with above-median risk-adjusted returns by the total number of stocks held in the fund. This process produces 25 (5x5) clusters. Then, we track subsequent one-year returns from the day of the holdings release. Since our sample of the holdings data is from January 1, 1982-December 31, 2008, subsequent one-year fund returns data are from January 1, 1983-December 31, 2009. All returns are in monthly scale. Standard errors of the difference between returns for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

Note that we measure subsequent one-year fund returns in four different ways. First, we calculate fund alphas from the daily return series using the Carhart (1997) four-factor model. Additionally, we compute the benchmark-adjusted return of each stock every month. Daniel et al.'s (1997) benchmark-adjusted return is calculated by subtracting size, book-to-market, and momentum benchmark returns from a stock's return. A fund's benchmark-adjusted return is the weighted average of an individual stock's benchmark-adjusted returns. Next, we construct the monthly holdings-based return, which tracks stock returns based on the latest fund holdings (see Kacperczyk et al., 2008 for details). Finally, we obtain monthly, fee-adjusted returns from the CRSP mutual fund database.

Past Performance Quintile 1 (Lowest)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.01%	0.07%	0.21%	0.15%
Win-Loss Quintile 4	-0.01%	0.03%	0.11%	0.01%
Win-Loss Quintile 3	-0.05%	-0.05%	0.01%	0.02%
Win-Loss Quintile 2	-0.05%	-0.09%	0.00%	-0.00%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.09%	-0.14%	0.04%	0.01%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.10%* (0.03%)	0.21% (0.08%)	0.17% (0.08%)	0.14% (0.08%)

Past Performance Quintile 2 (Low)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.08%	0.02%	0.15%	0.14%
Win-Loss Quintile 4	0.01%	-0.05%	-0.06%	-0.06%
Win-Loss Quintile 3	-0.02%	-0.02%	-0.02%	-0.00%
Win-Loss Quintile 2	-0.04%	-0.12%	-0.05%	-0.08%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.11%	-0.09%	0.04%	0.01%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.19%* (0.03%)	0.11% (0.08%)	0.11% (0.07%)	0.13% (0.07%)

Past Performance Quintile 3 (Mid)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.08%	0.12%	0.04%	0.03%
Win-Loss Quintile 4	-0.01%	-0.02%	-0.14%	-0.11%
Win-Loss Quintile 3	-0.01%	-0.03%	-0.08%	-0.10%
Win-Loss Quintile 2	-0.06%	-0.03%	-0.01%	-0.01%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.08%	-0.07%	0.04%	0.02%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.16%* (0.03%)	0.19%* (0.06%)	0.00% (0.07%)	0.01% (0.07%)

Past Performance Quintile 4 (High)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.02%	0.02%	-0.14%	-0.10%
Win-Loss Quintile 4	-0.04%	-0.12%	-0.17%	-0.15%
Win-Loss Quintile 3	-0.04%	-0.01%	-0.16%	-0.16%
Win-Loss Quintile 2	-0.02%	-0.07%	-0.04%	-0.03%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.07%	-0.03%	0.11%	0.09%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.09%* (0.03%)	0.05% (0.07%)	-0.25%* (0.07%)	-0.19% (0.07%)

Past Performance Quintile 5 (Highest)

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.22%	0.56%	0.02%	0.08%
Win-Loss Quintile 4	0.09%	0.28%	-0.18%	-0.14%
Win-Loss Quintile 3	0.09%	0.15%	-0.06%	-0.03%
Win-Loss Quintile 2	0.02%	0.01%	-0.03%	-0.03%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.04%	-0.05%	0.03%	0.04%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.26%* (0.03%)	0.61%* (0.14%)	-0.01% (0.09%)	0.03% (0.09%)

Table 5.
Subsequent-Year Performances of Sample Mutual Funds Sorted by Our Win-Loss Record Measure:
Analysis of Two Subsample Periods

We calculate our win-loss record measure for each mutual fund holdings report by dividing the number of stocks in the fund with above-median risk-adjusted returns by the total number of stocks held in the fund. We rank sample mutual funds to quintiles by comparing with other holdings reports released during the same previous one-year period. Then, we track subsequent one-year returns from the day of the holdings release. Since our sample of the holdings data is from January 1, 1982-December 31, 2008, subsequent one-year fund returns data are from January 1, 1983-December 31, 2009. We divide our sample into two subsample periods. All returns are in monthly scale. Standard errors of the difference between returns for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

Note that we measure subsequent one-year fund returns in four different ways. First, we calculate fund alphas from the daily return series using the Carhart (1997) four-factor model. Additionally, we compute the benchmark-adjusted return of each stock every month. Daniel et al.'s (1997) benchmark-adjusted return is calculated by subtracting size, book-to-market, and momentum benchmark returns from a stock's return. A fund's benchmark-adjusted return is the weighted average of an individual stock's benchmark-adjusted returns. Next, we construct the monthly holdings-based return, which tracks stock returns based on the latest fund holdings (see Kacperczyk et al., 2008 for details). Finally, we obtain monthly, fee-adjusted returns from the CRSP mutual fund database.

Panel A: Subsample Period of January 1, 1983-December 31, 1995

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.03%	-0.04%	0.32%	0.27%
Win-Loss Quintile 4	-0.03%	-0.12%	0.12%	0.12%
Win-Loss Quintile 3	-0.04%	-0.16%	0.09%	0.08%
Win-Loss Quintile 2	-0.04%	-0.34%	-0.02%	-0.03%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.07%	-0.44%	-0.10%	-0.12%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.10%* (0.02%)	0.40%* (0.06%)	0.42%* (0.04%)	0.39%* (0.04%)

Panel B: Subsample Period of January 1, 1996-December 31, 2009

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings-Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.12%	0.36%	0.10%	0.12%
Win-Loss Quintile 4	0.03%	0.04%	-0.14%	-0.11%
Win-Loss Quintile 3	-0.01%	-0.04%	-0.15%	-0.15%
Win-Loss Quintile 2	-0.02%	0.00%	-0.02%	-0.02%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.10%	0.06%	0.11%	0.09%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.22%* (0.02%)	0.30%* (0.05%)	-0.01% (0.04%)	0.03% (0.04%)

Table 6.
Subsequent-Year Performances of Sample Mutual Funds Sorted by an Alternative Win-Loss Record Measure

We calculate an alternative win-loss record measure for each mutual fund holdings report by dividing the number of stocks in the fund with the above-upper 75th percentile risk-adjusted returns by the total number of stocks held in the fund. We rank sample mutual funds to quintiles by comparing with other holdings reports released during the same previous one-year period. Then, we track subsequent one-year returns from the day of the holdings release. Since our sample of the holdings data is from January 1, 1982-December 31, 2008, subsequent one-year fund returns data are from January 1, 1983-December 31, 2009. All returns are in monthly scale. Standard errors of the difference between returns for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

Note that we measure subsequent one-year fund returns in four different ways. First, we calculate fund alphas from the daily return series using the Carhart (1997) four-factor model. Additionally, we compute the benchmark-adjusted return of each stock every month. Daniel et al.'s (1997) benchmark-adjusted return is calculated by subtracting size, book-to-market, and momentum benchmark returns from a stock's return. A fund's benchmark-adjusted return is the weighted average of an individual stock's benchmark-adjusted returns. Next, we construct the monthly holdings-based return, which tracks stock returns based on the latest fund holdings (see Kacperczyk et al., 2008 for details). Finally, we obtain monthly, fee-adjusted returns from the CRSP mutual fund database.

	Alphas (4-factor)	DGTW Benchmark- Adjusted Return	Holdings- Based Return	Realized Return (after fees)
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.08%	0.19%	0.12%	0.15%
Win-Loss Quintile 4	0.03%	0.02%	0.01%	0.02%
Win-Loss Quintile 3	-0.01%	-0.03%	-0.03%	-0.05%
Win-Loss Quintile 2	-0.04%	-0.05%	-0.04%	-0.05%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	-0.09%	-0.10%	-0.05%	-0.07%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.17%* (0.01%)	0.29%* (0.05%)	0.17%* (0.04%)	0.22%* (0.03%)

Table 7.
Expense Ratios and Management Fees for Sample Mutual Funds Sorted by Our Win-Loss Record Measure

We calculate our win-loss record measure for each mutual fund holdings report by dividing the number of stocks in the fund with above-median risk-adjusted returns by the total number of stocks held in the fund. We rank sample mutual funds to quintiles by comparing with other holdings reports released during the same previous one-year period. For each win-loss quintile, we report the average expense ratio and management fee acquired from the CSRP Mutual Fund Data. Note that expense ratios and fees are in annual scale. Our sample of the holdings data is from January 1, 1982-December 31, 2008. Standard errors of the difference between ratios/fees for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

	Expense Ratios (Annual)	Management Fees (Annual)
Win-Loss Quintile 5 (Highest Win-Loss Record)	1.50%	0.83%
Win-Loss Quintile 4	1.37%	0.79%
Win-Loss Quintile 3	1.32%	0.78%
Win-Loss Quintile 2	1.33%	0.77%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	1.38%	0.78%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.12%* (0.02%)	0.05%* (0.01%)

Table 8.**Other Performance Predictors for Sample Mutual Funds Sorted by Our Win-Loss Record Measure**

We calculate our win-loss record measure for each mutual fund holdings report by dividing the number of stocks in the fund with above-median risk-adjusted returns by the total number of stocks held in the fund. We rank sample mutual funds to quintiles by comparing with other holdings reports released during the same previous one-year period. For each win-loss record quintile, we calculate averages of Industry Concentration (Kacperczyk et al., 2005), Active Share Ratio (Cremers and Petajisto, 2009; Petajisto, 2013), and Return Gap (Kacperczyk et al., 2008). Standard errors of the difference between predictors for the highest win-loss quintile and for the lowest win-loss quintile are in parentheses. The coefficients significant at the 1% level are marked with *.

	Industry Concentration	Active Share Ratio	Return Gap
Win-Loss Quintile 5 (Highest Win-Loss Record)	0.177	0.835	-0.094%
Win-Loss Quintile 4	0.134	0.799	-0.119%
Win-Loss Quintile 3	0.125	0.795	-0.136%
Win-Loss Quintile 2	0.120	0.788	-0.145%
Win-Loss Quintile 1 (Lowest Win-Loss Record)	0.153	0.796	-0.138%
Difference between Quintile 5 and Quintile 1 (High – Low)	0.024* (0.003)	0.039* (0.003)	0.044%* (0.010%)

Figure 1. Estimation of Fund Win-Loss Record and Subsequent Performance

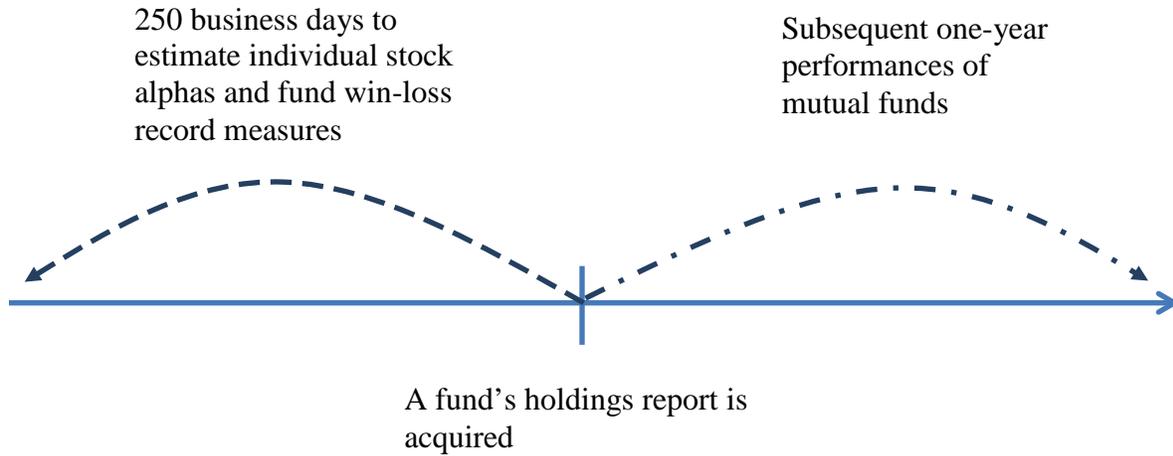


Figure 2. Ranking of Funds by Win-Loss Record and Their Subsequent Performance

