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Are the AAII stock screens a useful tool for investors?

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Abstract

The American Association of Individual Investors (AAII) offers a variety of screening tools to help investors select stocks. We analyze the effectiveness of these tools. While we find support for AAII's statement that 91% of their screened portfolios beat the S&P 500, we note that this overstates the effectiveness of their screens. Many of the return differences are not statistically significant, and their analysis ignores transactions costs and risk differences. Our analysis reveals that when transactions costs are considered, 32% significantly beat the S&P 500, and 26% of low transaction cost strategies significantly beat their best-fit indices. © 2008 Academy of Financial Services. All rights reserved.

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1. Introduction

Over the years a handful of investors have become well known for their skills at consistently identifying portfolios of stocks that "beat the market." These include such well recognized names as Warren Buffett, Peter Lynch, David Dreman, Martin Zweig, John Neff, and William O'Neal. The interest of individual investors in trying to duplicate the performance of these market marvels is high as witnessed by the overwhelming volume of books in the popular press that deal with investor success stories and how to duplicate their performance. Financial advisors get wealthy from providing advice and so do authors of investment books. Trying to duplicate the performance of these authors is a daunting task very few can master.

A recurring issue is if there is an easier and less expensive way to try to out-perform the market, especially for the average investor. In this article, we evaluate one approach that is

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of very low cost and available to anyone with some time at the end of each month to rebalance their portfolio. Specifically, we analyze the performance of a number of screening techniques identified and offered by the American Association of Individual Investors (AAII), a nonprofit investment education organization based in Chicago. Through their Website (www.aaii.com) and several print publications, AAII attempts to educate individual investors and offers a number of tools to help investors build wealth. One of the tools offered is stock screening. AAII screens stocks to create 61 portfolios designed to take advantage of popular investment techniques. Regarding the screening process, AAII states:

> The AAII Stock Screens area allows you to tap into the investment styles, ideas and methodologies of over 60 promising investment luminaries. Collectively, 91% of the Stock Screens we featured have beaten the S&P 500 since we introduced this popular members-only service.[1]

We want to point out that AAII does not recommend that their members blindly follow any of these screens but that they should be used as a starting point for further analysis. Even after acknowledging their caveat, the claim that 91% of their screened portfolios beat the S&P 500 is a strong statement that certainly deserves further scrutiny. In this article, we examine this assertion and perform additional analyses comparing the performance of these portfolios to alternative benchmarks. We specifically address seven questions:

1. Do 91% of these screens beat the S&P 500 index as claimed by AAII?
2. Do these screens beat their best-fit index?
3. Do these screens beat the S&P 500 index on a risk-adjusted basis?
4. Do these screens beat their best-fit index on a risk-adjusted basis?
5. Do these screens beat the S&P 500 index when commission costs are included?
6. Do these screens beat their best-fit index when commission costs are included?
7. Do these screens *significantly* outperform the S&P 500 and their best-fit indices?

In the following section, we review prior literature relevant to the issues addressed in this research. Later sections describe the stock screens followed by AAII, describe the general financial characteristics of the screened portfolios, evaluate the performance of these screens, and present the results of our analyses. The final section summarizes our findings and conclusions.

2. Prior research

This article contributes to three areas in the finance literature. It contributes to the broad, related areas of market efficiency and behavioral finance, and in addition, it has a narrower focus, contributing specifically to the literature examining the ability of practical investment strategies to beat the market. Although this latter area is admittedly tied into the market efficiency debate, it also has practical implications for individual investors and is thus the primary focus of this review.

Put simply, the theory of market efficiency states that market prices fully reflect available information. Although market efficiency was long upheld as “fact” in the academic com-

munity (see Fama, 1970), this began to change as research in the 1980s found that returns could be predicted based on size (Banz, 1981), past returns (Debondt and Thaler, 1985 & 1987), and dividend yields (Fama and French, 1988). The 1990s brought additional challenges in the form of long-run event studies that provide evidence of both stock price overreaction and underreaction to various corporate events.[2]

These studies led to the development of new behavioral theories directly contrary to the efficient markets hypothesis and brought behavioral finance into the mainstream of academic research. Proponents of behavioral finance believe that asset prices are not determined solely by rational investors, as the efficient markets theory assumes. They suggest that equilibrium prices reflect the weighted average of the beliefs of both rational and irrational traders (Hirchleifer, 2001).

Fama (1970) points out that an important empirical implication of the efficient markets theory is that profitable trading strategies (those earning abnormal returns) based on public information are not possible. However, if a large portion of the market is irrational and subject to systematic biases, as the behavioral literature suggests,[3] then it may be possible for certain investors or investment strategies to earn abnormal returns. We now turn to the literature that examines effectiveness of individual stock and investment strategy recommendations. Although this research has implications for the market efficiency debate, it also has practical implications for individual investors. Metrick (1999) notes:

> "As a greater number of individuals participate in equity markets it becomes increasingly important for financial economists to form scientific opinions about the behavior and performance of retail investors and the advisors they follow."

This literature can be divided into two streams. The first addresses the recommendation of specific stocks by individuals in the media, whereas the second addresses the effectiveness of more mechanical systems that recommend stocks based on some objective criteria. We address the former stream first.

From the media stream of research, Desai and Jain (1995) examine whether or not abnormal returns can be earned by investing in stocks recommended by "Superstar" analysts, published in Barron's following their annual roundtable. Although they find abnormal returns during the time period between the roundtable meeting and the publication of the recommendations, they find that no abnormal returns would accrue to an individual investor acting on the recommendations after publication. Similarly, Metrick (1999) examines the recommendations made by 153 investment newsletters and finds the recommended securities do not generate abnormal returns. This result holds for the group of newsletters as a whole and for each newsletter individually. Thus, these studies find no value in these published recommendations.

Studies finding contrary evidence include Palman, Sun and Tang (1994) and Anderson and Loviscek (2005). Palman, Sun and Tang (1994) find abnormal returns around the publication of analyst recommendations in Business Week, and Anderson and Loviscek (2005) find some evidence that portfolios constructed using the top five picks from the book "The 100 Best Stocks to Own in America" can outperform the market.

Similar research has also been conducted using the recommendations made by analysts on the television program "Wall Street Week with Louis Rukheyser." Here, the evidence is

mixed. Whereas studies by Pari (1987); Griffin, Jones and Zmijewski (1995); and Beltz and Jennings (1997) all find significant returns to recommended stocks on the first trading day after the program, their findings regarding long run returns differ. Pari (1987) and Beltz and Jennings (1997) each find negative long-run abnormal returns to recommended stocks, whereas Griffin, Jones and Zmijewski (1995) find significant positive long-run (over the following year) abnormal returns to recommended stocks. Ferreira and Smith (2003), note problems with the methodology of the earlier studies and address this question again, using alternative methods to calculate long-run abnormal returns. They find both short-run and long-run abnormal returns could be earned by purchasing recommended stocks.

The literature reviewed above shows mixed results as stock recommendations from some sources produce abnormal returns while recommendations from others do not. One possible explanation for the mixed results is that the recommenders may suffer from some form of systematic biases observed in the behavioral finance literature. If this is the case then perhaps recommendations based on more mechanical rules that remove emotions and systematic biases would perform better. We now discuss the literature related to this final question. Previous research in this area includes Olson, Nelson, Witt and Mossman (1998); Loviscek and Jordan (2000); and Choi (2000).

Olson, Nelson, Witt and Mossman (1998) examine the profitability of trading strategies derived from the proprietary stock rankings of the Investor's Business Daily. They find that purchasing highly ranked stocks provides significant abnormal returns. Loviscek and Jordan (2000) examine whether or not abnormal returns can be earned by constructing portfolios containing the top holdings of five-star mutual funds. Although they find some evidence of long-run abnormal returns, they conclude their results are not strong enough to recommend the strategy. Finally, Choi (2000) examines the performance of stocks receiving the highest Value Line timeliness rankings and finds that these stocks provide abnormal returns even after controlling for size, BTM, momentum, and earnings surprises, though Choi (2000) notes that transactions costs may eat away abnormal returns.[4] These findings provide some support for the notion that by eliminating emotion and the human biases from the stock selection process, investors may earn abnormal returns. We contribute to this literature by examining whether 54 mechanical strategies offered by AAI can provide individual investors with abnormal returns.

3. Overview of the AAII screens

The AAII reports the monthly return on a total of 78 portfolios beginning with January 1998. Of these 78 portfolios, 16 are stock market indices. These indices include the Dow Jones Industrial Average and the S&P 500, as well as a number of midcap, small cap, growth, and value portfolios. One of the 78 portfolios represents the monthly risk-free rate, measured by the return on Treasury Bills. For a complete list of the market index portfolios see Table 1.[5] This table also presents several portfolio characteristics, including Sharpe's risk-adjusted performance measure; the total risk, as measured by the standard deviation of monthly returns; and the compounded cumulative return of these portfolios over the 96-month sample period.

Table 1 Market indices followed in the AAII stock screener

Index	Sharpe Ratio[a]	Standard Deviation[a]	Cumulative Return[a]
S&P 500 price change	.019	4.63%	28.6%
S&P midcap 400 price change	.127	5.51%	121.4%
S&P small cap 600 price change	.102	5.84%	93.6%
Nasdaq 100 price change	.079	10.5%	66.2%
Dow Jones 30 price change	.033	4.73%	35.5%
S&P 500	.047	4.65%	45.2%
S&P/Barra 500 growth	.027	5.12%	32.5%
S&P/Barra 500 value	.060	4.74%	55.1%
S&P midcap 400	.148	5.34%	142.5%
S&P midcap growth	.130	6.48%	142.6%
S&P midcap value	.155	5.07%	144.6%
S&P smallcap 600	.116	5.69%	106.6%
S&P small cap growth	.094	6.34%	87.5%
S&P small cap value	.121	5.50%	112.6%
All exchange listed stocks	.163	6.64%	199.9%
All ADRs	.087	7.06%	91.2%
T-bills	0.01	0.16%	31.3%

Note. [a] The Sharpe ratio and standard deviation are measured on monthly return and risk. The cumulative return is the portfolio total return compounded monthly over the eight year time period of January 1998 through December 2005.

The remaining 61 portfolios are the portfolios created using the different AAII quantitative screens. Many of these portfolios are developed from the approaches of well-known investors such as Benjamin Graham, James O'Shaughnessy, Warren Buffett, William O'Neil, David Dremen, and Martin Zweig. AAII is clear in making it known to users of these screens that the actual screens are based on AAIIs interpretation of the writings and other information about these investors. They do not claim that the securities passing these screens represent what these "gurus" would actually recommend. In addition to these well-known investor screens there are other screens based on popular screening models that are not identified with any particular individual but have become broadly popular through a variety of studies.

The source of the data on which the screens are run is the AAII Stock Investor Pro database. This database currently contains about 8,500 stocks and ADRs traded in the U.S. financial markets. AAII sends CDs monthly to all Stock Investor Pro subscribers. However, the most current financial data for firms in the database can be downloaded weekly from the AAII Website. The online information is updated weekly from Reuters after the end of the Friday business day and is usually available to Stock Investor Pro subscribers by Monday of the following week.

To create return data for their 61 investment strategy portfolios, AAII performs their screens at the end of each month and then hypothetically purchases an equally weighted portfolio of all stocks that pass the screen. The purchase price of the stocks is the closing price on the last trading day of the month. AAII then assumes that the stocks are sold on the last trading day of the following month. The return is calculated based on the change in price during the month. No dividend payments are included in the return calculation. The process is repeated each month. Note that AAIIs rebalancing assumes all securities are sold, even if

they pass the screen the following month. Thus, if a security passes the screen in consecutive months, it would be sold and repurchased the following month to ensure equal weighting. Later in this article, we use this 100% turnover approach when including commissions in our methodology. This maximum turnover assumption assures that our commission estimates are most likely overstated because investors may not actually fully turnover the portfolio each month if a security has virtually equal weighting without rebalancing. Based on AAII data the actual average monthly turnover for the portfolios is 40%.

4. AAII screens used in this study

For our analysis, we begin with the 61 screened portfolios. We eliminate seven portfolios that do not have return data for the full eight-year sample period. The screens for the eliminated portfolios were not developed at the beginning of the sample period.[6] The majority of the empirics in this study are completed using the remaining 54 portfolios. For the list of these 54 portfolios, see Table 2.

Also shown in Table 2 is the fact that AAII divides the screened portfolios into five subgroups. The groups are value, growth, value/growth, specialty/sector, and unclassified. These groups are determined by AAII and are based on the general investment characteristics of the screen. Five of the 54 screens were placed into the unclassified category and were not included in our sample for the analysis that includes comparison among these groups.[7] Of the 49 classified screened portfolios, there are 18 value portfolios, seven growth portfolios, 16 growth/value portfolios, and eight specialty/sector portfolios.

We start our research by examining the financial statistics of each of these four groups of portfolios to determine if they have characteristics normally associated with their classification.[8] The relative average values of risk variables, value indicators, growth indicators, and technical indicators were all in the direction that would be expected for distinguishing among the AAII classifications.

5. Aggregate performance analysis

In this section, we pursue answers to the first four questions of our study that were presented in the Introduction. We address the AAII claim that 91% of their stock screens have outperformed the S&P 500. In addition, recognizing that the S&P 500 may not be the appropriate benchmark for all portfolios, we compare each portfolio's returns with those of alternative benchmarks. Finally, to account for risk, we compare each strategy's Sharpe ratio with those of the S&P 500 and the alternative benchmarks. The sample period used for this and the other analyses in this study is the 96 month period beginning with January 1998 and ending with December 2005. This period covers a variety of economic conditions and events, including the technology bubble, the down economy of 2001 and 2002, the 9/11 attacks, hurricane Katrina in 2004, rising oil prices, several areas of turmoil in the Mideast, and the economic recovery from 2003 through 2005.

Our first analysis is a comparison of the raw cumulative returns of the screened portfolios

Table 2 The names and style classifications of the 54 screens used by AAII for portfolios[a]

Growth screens	Growth/value
O'Neil's CANSLIM	Buffett-Hangstrom
O'Neils's CANSLIM Revised 3rd ed.	Buffettology-EPS Growth
Foolish Small Cap 8	Buffettology-Sustainable Growth
Foolish Small Cap 8 Revised	Fisher (Philip)
IBD Stable 70	Lynch
Inve$tWare Quality Growth	Muhlenkamp
Return on Equity	O'Shaughnessy-Growth
	Oberweis Octagon
Value	Value on the Move-PEG with Est Growth
Cash Rich Firms	Value on the Move-PEG with Historical Growth
Dividend (High Relative Yield)	Price to Sales
Dogs of the Dow	T. Rowe Price
Dogs of the Dow Low Priced 5	Templeton
Dreman	Wanger (Revised)
Dreman with Est. Revisions	Stock Market Winners
Dividend Screen – DRPs	Zweig
Dividend Screen – Non-DRPs	
Price-to-Free-Cash-Flow	Specialty/sector
Fundamental Rule of Thumb	ADRs
Graham Defensive Investor Non-utility	Dual Cash Flow
Graham Enterprising Investor IBD Stable 70	Estimated Revisions Down
Lakonishok	Estimated Revisions Down 5%
Neff	Estimated Revisions Up
O'Shaughnessy-Value	Estimated Revisions Up 5%
P/E Relative	Graham Defensive Investor (Utility)
Piotroski	Murphy Technology
Weiss Blue Chip Dividend Yield	
	No classification
	Dreman Revised
	All DRPs
	Estimated Revisions Down Lowest 30
	Estimated Revisions Up Top 30
	Low Price to Book Ratio

Note. [a] Screen names and classifications are those used by AAII.

to those of the S&P 500.[9] Of the 54 screens with full data 50 earned higher gross returns than the S&P 500 index. These results translate to a 92.59% out-performance rate versus the S&P 500.[10] Thus, for the eight years through December 2005, AAIIs claim that 91% of the screens "beat the S&P 500" is confirmed. Over this period, the return of the S&P 500 Price Change index was 28.3%. The average cumulative return on the screened portfolios was 39.12%, ranging from a minimum return of -28.96% to a maximum return of 1,659.29%.

A straight up comparison with the S&P 500 provides interesting results, but as mentioned above, the S&P 500 may not be the most relevant benchmark for all of our portfolios. To deal with this issue, we also compare the cumulative returns of the screened portfolios to the cumulative returns of their best-fit indices. To identify each portfolio's best-fit index, we created a correlation matrix between the 96 monthly returns for each screened portfolio and the monthly returns for the 16 market index portfolios. A portfolio's best-fit index is defined simply as the index with which it is most highly correlated. We find that 43 of the 54 screened

Table 3 The S&P 500 index and the screened portfolios and their associated best-fit index

Index	Number of screened portfolios that are most highly correlated	Average beta of correlated Portfolios[a]
S&P 500 price change	1	0.97
S&P midcap 400 price change	5	0.84
S&P small cap 600 price change	6	0.90
Nasdaq 100 price change	0	
Dow Jones 30 price change	2	1.05
S&P 500	0	
S&P/Barra 500 growth	0	
S&P/Barra 500 value	0	
S&P midcap 400	0	
S&P midcap growth	0	
S&P midcap value	12	0.83
S&P smallcap 600	1	0.63
S&P small cap growth	5	1.18
S&P small cap value	11	0.95
All exchange listed stocks	9	0.92
All ADRs	2	1.04
Average of all 54 portfolios		0.93

Note. [a] Beta is included to show the average risk of the screened portfolios relative to their best-fit index. The betas were calculated using the best-fit index as the independent variable. Eighteen of the 54 portfolios have a beta greater than its associated market.

portfolios out-perform their appropriate best-fit index. This converts to a 79.63% out-performance rate, slightly lower than the 91% achieved by comparison with the S&P 500.

To answer our third and fourth questions, and to more fully account for the differences in risk that exists in risk between the screened portfolios and the S&P 500, we use the Sharpe performance measure. Sample portfolios with higher Sharpe ratios than the market Sharpe ratio are considered to have out-performed the market on a risk-adjusted basis.

When we compare the Sharpe ratios of each sample portfolio to the Sharpe ratio for the S&P 500 index we find that 53 of the 54 screened portfolios have Sharpe ratios that are higher than the 0.019 Sharpe ratio of the S&P 500. Only the Dogs of the Dow portfolio had a lower Sharpe ratio. Because most of the screened portfolios do not contain large capitalization stocks and have different risk characteristics than the S&P 500, we also compare their Sharpe ratios to those of their best-fit indices. When we compare the Sharpe ratio for each portfolio to the Sharpe ratio of its most highly correlated market index portfolio we find that 40 of the 54 portfolios have Sharpe ratios that are higher than the Sharpe ratio for their comparison index. In this comparison, 72.2% of the screened portfolios outperform their appropriate benchmark indices on a risk-adjusted basis. The number of screened portfolios correlating with each index is shown in Table 3.[11]

6. Performance results after transaction cost adjustments

To this point, all of our analyses have ignored transactions costs. However, an investor following any of the AAII strategies would incur significant trading costs beyond those

incurred in a buy and hold index strategy. As such, the relevant question becomes, can these strategies outperform their appropriate market index after adjusting for transaction costs? In this section and the following section, we answer our questions five and six.

With the availability of today's online brokerage, we can easily include an accurate estimate of brokerage commissions. Although we admittedly ignore the existence of spreads and slippage, as these cannot be comfortably estimated, the commissions would be the most significant cost.[12] Our commissions are estimates based on the average number of stocks held in the portfolio over the eight year (96 month) time period of the study. We assume commissions are a fixed $7.00 per trade, which is a reasonable online brokerage commission.[13] To make sure our approach is clear, we will illustrate the use of transaction costs by using the 15 stock average holdings of the Driehaus portfolio. To initiate the portfolio in January 1998, we would purchase 15 stocks, so we multiply the 15 stocks by the $7.00 per trade fee for a total cost of $105.00. For each month after the initial month we assume a round trip of selling the 15 existing stocks and buying the 15 replacements, even if they are the same stocks. This cost is 15 times 2 times $7.00 for a total of $210.00 per month.[14]

To conduct our tests, we assume that the investor has enough money in their portfolio to purchase all of the stocks in the screened portfolios. The smallest number for average holdings for a portfolio is five and the largest number of holdings is 191.[15] The average number of holdings for all 54 portfolios is 34 stocks. Although strategies with high average holdings will have their returns greatly reduced by transactions costs and should possibly be avoided by investors, we include all strategies for the majority of our analyses.

We conduct our tests by assuming an equal dollar amount is invested into each stock in a portfolio. Because of the semi-fixed nature of the brokerage costs we use several portfolio beginning dollar amounts to examine the likelihood of success for investors with differing amounts to invest. We focus on our analyses using initial investments of $50,000 and $100,000.[16] For both amounts, we perform our initial return comparison using the S&P 500 index. To illustrate the dollar accumulations, cumulative returns, and the annualized compound returns we present these variables for the ten best performing screened portfolios using the $50,000 scenario. These values are presented in Table 4.

When we consider the $50,000 initial investment and the $100,000 initial investment, the results are impressive. With the $50,000 investment, only five portfolios end up with negative values. Forty-one of the 54 portfolios achieve a greater ending dollar balance than the $50,000 investment, and 36 of the 41 portfolios, or 66.67%, outperform the S&P 500 index. When we consider the $100,000 initial investment only two portfolios end up with negative values, 48 portfolios end up with greater than the original $100,000 investment, and 46 of the 48 portfolios outperform the S&P 500 market index.[17] From the total of 54 screened portfolios, we now observe an 85.19% out-performance rate.[18]

The results of this analysis including transactions costs suggest that the AAII claim that 91% of the portfolios out-perform the S&P 500 index should be modified. It should include statements saying that transaction costs would lower your returns and that when transaction costs are considered, actual performance depends greatly on the size of the initial investment.

Table 4 Wealth accumulation and returns on top 10 screened portfolios with initial investment of $50,000 vs. the S&P 500 price change index

Screen	Cumulative dollar value	Cumulative percent return	Annualized compounded return
S&P 500	$64,316	28.63	3.20
Zweig	$772,473	1444.95	40.80
Piotroski	$493,516	887.03	33.13
O'Neil's CAN SLIM	$430,004	760.01	30.86
Neff	$333,301	566.60	26.76
Foolish Small Cap 8 Revised	$313,059	526.12	25.77
Stock Market Winners	$309,390	518.78	25.59
O'Neil's CAN SLIM Revised 3rd Edition	$306,356	512.71	25.43
Estimated Revisions Up 5%	$259,082	418.16	22.83
Estimated Revisions Up top 30	$258,757	417.53	22.81
Graham Enterprising Investor	$200,961	301.92	18.99

7. Alternative benchmark performance analysis including transaction costs

In this section, we compare the cumulative returns, including transactions costs, of each portfolio with those of the indices with which they are most highly correlated. Recall from our earlier analysis where we did not include transaction costs 43 of the 54 portfolios (79.63%) had returns greater than their best-fit index. Now we examine what happens when we include transactions cost in this analysis. We use the same two-dollar starting levels we used in the previous section. When we use $50,000 as our initial investment, 20 portfolios or 37.04% beat their best-fit indices. When we increase the initial investment to $100,000, 31 of the portfolios or 57.41% outperform their benchmark indices.

Although the dollar values in Table 4 are impressive, the return values and risk comparisons shown in Table 5 provide a better interpretative view. Some of these portfolios double and triple the annualized compounded return of their best-fit indices, and the smallest annualized return shown, that of the Graham Enterprising Investors portfolio, is nearly 19%. Most of the top performers come from the small and midcap universe. However, this outcome is not attributable to the higher risk associated with small capitalization firms. For all 10 portfolios, the Sharpe ratios for the screened portfolios are larger than the Sharpe ratios for their best-fit indices. The top two portfolios, the Zweig portfolio and the Piotroski portfolio, are associated with the S&P Midcap Value index and the All Exchange Listed Stock index, respectively. Note these two top performers do not carry the higher risk of small capitalization firms.

The analysis in this section produces some important results that are worth recapping. First we show, assuming a $50,000 initial investment, that over a third (20 portfolios or 37.04%) of the portfolio strategies provide risk-adjusted and cost-adjusted returns that are greater than those of their appropriate benchmarks. When a $100,000 initial investment is considered, the out-performance rate increases to 57.41%. Low transaction costs, however, are not the only factor in determining the success of a strategy. Of the 31 portfolios that beat their best-fit indices, seven portfolios held an average number of securities greater than the average of 34

Table 5 Percent returns and Sharpe ratio on top 10 screened portfolios with initial investment of $50,000 vs. the screened portfolio's best fit index

Screen (Sharpe ratio)	Screened portfolio	Best fit index	Best fit index
	Annualized return	Sharpe ratio	Annualized return
Zweig (.365)	40.80%	.155	11.83%[a]
Piotroski (.298)	33.13%	.163	14.72%[b]
O'Neil's CAN SLIM (.350)	30.86%	.116	9.49%[c]
Neff (.314)	26.76%	.121	9.89%[d]
Foolish Small Cap 8 Revised (.233)	25.77%	.094	8.17%[e]
Stock Market Winners (.317)	25.59%	.163	14.72%[b]
O'Neil's CAN SLIM Revised 3rd Edition (.227)	25.43%	.094	8.17%[e]
Estimated Revisions Up 5% (.261)	22.83%	.094	8.17%[e]
Estimated Revisions Up top 30 (.247)	22.81%	.094	8.17%[e]
Graham Enterprising Investor (.201)	18.99%	.155	11.83%[a]

Notes. [a] S&P midcap value index.
[b] All exchange listed stocks index.
[c] S&P smallcap 600 index.
[d] S&P smallcap value index.
[e] S&P smallcap growth index.

for the entire 54 portfolio sample. These seven portfolios had average holdings of 47.43 stocks. The average holdings of the 31 out-performance portfolios is 24.83 stocks.

Perhaps one of the most interesting points can be gleaned by comparing the performance data from Table 5 and the investment style classes from Table 2. Of the ten top performers from Table 5, three are from the value classification, three are from the growth group, two are from the growth/value group, one is from the specialty/sector classification, and one is from the nonclassified portfolios. Thus, the top performers are determined by the content of their screens rather than by their particular investment style.

8. Significance tests of screened portfolios

The comparisons presented thus far provide some evidence that investors may be able to use these AAII screens to out-perform the market on a risk-adjusted basis. However, we need to take one more step and answer our seventh question. We determine whether or not these results are statistically significant. We perform significance tests on both the differences between the monthly returns on the stock screen portfolios and the monthly returns of the S&P 500 index and the difference between the portfolio returns and those of the best-fit benchmarks. We conduct this analysis both with and without transactions costs. We use one-tailed tests, since we are interested in the portion of portfolios that significantly outperform the market, and report results for the 1%, 5%, and 10% significance levels. For tests of the mean and median differences we use *t*-tests and Wilcoxon signed rank tests, respectively.

For our tests, we assume the base portfolio value of $50,000. The use of a $100,000 base would improve the results but we chose to report the more conservative value. Given the fact

Table 6 Numbers of AAII portfolios significantly beating the S&P 500 index and the best-fit Indices: All strategies

Panel A: Results based on returns excluding transactions costs						
	S&P 500 index			Best fit index		
Significance level	.01	0.05	0.10	.01	0.05	0.10
Comparison against mean return						
Number of portfolios	27	41	47	17	26	30
Percent of portfolios (n = 54)	50.0%	75.9%	87.0%	31.5%	48.1%	55.6%
Comparison against median return						
Number of portfolios	25	38	43	13	27	32
Percent of portfolios (n = 54)	46.3%	70.4%	79.6%	24.1%	50.0%	59.3%
Panel B: Results based on returns including transactions costs						
Significance level	.01	0.05	0.10	.01	0.05	0.10
Comparison against mean return						
Number of portfolios	9	17	24	7	10	15
Percent of portfolios (n = 54)	16.7%	31.5%	44.4%	13.0%	18.5%	27.8%
Comparison against median return						
Number of portfolios	8	15	25	7	12	15
Percent of portfolios (n = 54)	14.8%	27.8%	46.3%	13%	22.2%	27.8%

that portfolios containing very large numbers of stocks would be expected to have inferior performance (because of transactions costs), we run the tests on both the entire sample and a subsample that eliminates the largest portfolios. The subsample includes the portfolios with average holdings below the median number of securities held by all strategies.[19] This division eliminates those portfolios that an investor could drop from consideration because of the high trading costs and the greater time commitment of monitoring and trading a large number of stocks each month.

The results of this analysis are presented in Tables 6 and 7. Table 6 shows the numbers and percentages of all of the strategies significantly beating the S&P 500 index and their best-fit indices.[20] Panel A presents this information based on returns that exclude transactions costs, whereas Panel B presents the results when transactions costs are included in the returns. Here, as in our earlier discussion, the transactions costs are based on an initial investment of $50,000. An investor with a larger initial investment would see more of the strategies beat the benchmarks, as transactions costs would be lower on a percentage basis. Thus, the assumption of a larger initial investment would produce results falling in between those presented in Panels A and B.[/exclude]

In our discussion, we focus on the significance tests based on the mean differences in returns. However, note that the results based on median return differences are similar to those based on the means. Panel A of Table 6 reveals that 75.9% of the strategies significantly beat the S&P 500, whereas 48.1% significantly beat their best-fit indices at the 5% significance level. When the 10% significance level is considered, 87% and 55.6% of strategies beat the S&P 500 and their best-fit indices, respectively. Panel B of Table 6 presents the same results when transactions costs are included. Here, these numbers fall, as only 31.5% and 18.5% beat

Table 7 Numbers of AAII portfolios significantly beating the S&P 500 Index and the best-fit indices: Low transaction strategies

Panel A: Results based on returns excluding transactions costs						
	S&P 500 index			Best fit index		
Significance level	.01	0.05	0.10	.01	0.05	0.10
Comparison against mean return						
Number of portfolios	11	20	22	7	12	14
Percent of portfolios (n = 27)	40.7%	71.4%	85.1%	25.9%	44.4%	51.9%
Comparison against median return						
Number of portfolios	9	17	20	3	13	15
Percent of portfolios (n = 27)	33.3%	63.0%	74.1%	11.1%	48.1%	59.3%
Panel B: Results based on returns including transactions costs						
Significance level	.01	0.05	0.10	.01	0.05	0.10
Comparison against mean return						
Number of portfolios	7	13	18	5	7	11
Percent of portfolios (n = 27)	25.9%	48.1%	66.7%	18.5%	25.9%	40.7%
Comparison against median return						
Number of portfolios (n = 27)	5	9	16	3	7	10
Percent of portfolios	18.5%	33.3%	59.3%	11.1%	25.9%	37.0%

the S&P 500 and best-fit indices, respectively at the 5% significance level and 44.4% and 27.8% beat these benchmarks at the 10% significance level.

The results of Panel B of Table 6 highlight the negative impact transactions costs may have. However, as investors could avoid the strategies with the highest transactions costs, they could eliminate some strategies. Table 7 contains information similar to that presented in Table 6; it presents the numbers and percentages of only the low transaction cost strategies (strategies holding below the median number of securities) that significantly beat the benchmarks. The results presented in Panel A of Table 7 are similar to the results in Panel A of Table 6. However, as the focus of Table 7 is on low transaction cost strategies, Panel B contains the most interesting findings. Panel B reveals that when only the low (below median) transaction cost strategies are considered, nearly half (48.1%) significantly beat the S&P 500, whereas over a quarter (25.9%) significantly beat their best fit indices at the 5% significance level. When the 10% significance level is considered, the percentages of firms beating the S&P 500 and their best-fit indices rise impressively to 66.7% and 40.7%, respectively.

9. Summary and conclusions

One of the most challenging tasks for individual investors is to identify stocks that should go into their portfolios. Given the thousands of available stocks, the first task has to be to identify some form of screening technique to reduce the population to a manageable number of appropriate securities. Taking the emotions out of the decision-making process is also part of the challenge investors must confront. If buy and sell decisions are based entirely on a

rigid and easy to follow set of quantitative rules then the emotions become less important. Under the "rules" approach behavior plays a role only to the extent that some belief factors will be present when the initial rules are established and in the ongoing attempt to stick to the rules through all phases of the market. The question is whether or not rules that beat the market can be identified.

The AAII offers its members a list of 61 stock portfolios each of which are based on the monthly running of a quantitative screens. After eliminating seven of these portfolios that do not have complete data for the eight years of the study, we rigorously test the performance of the remaining 54 portfolios, assuming an initial investment of either $50,000 or $100,000. Ignoring transactions costs, we find that 75.9% and 48.1% of the AAII portfolios significantly beat the S&P 500 and their best-fit indices, respectively. These percentages fall to 31.5% and 18.5%, respectively, when transactions costs are considered. We note that investors can lower their transaction costs by simply avoiding the strategies that require investors to hold large numbers of stocks. Considering this, we conduct or analysis using only strategies with below median average holdings. Here we find that even after transactions costs are considered, 48.1% of the portfolios significantly beat the S&P 500, whereas 25.9% significantly beat their best-fit indices. In addition, all of these portfolios had higher Sharpe ratios than both the S&P 500 and their best-fit indices. After completing our analyses, we conclude the following:

1. To follow any of the strategies offered by AAII the investor should have a minimum of $50,000 to invest.
2. The investment should be done in a tax-deferred account. We do not consider taxes in our study, but it is clear that paying taxes on multiple short-term gains would severely damage the portfolio value.
3. Investors should concentrate only on those screens that have historically out-performed their best-fit index on a risk-adjusted basis.
4. The best performing screens come from the value, growth, and value/growth combination styles. Investors should consider which styles are most appropriate for their risk tolerances.
5. Investors using the AAII screens should do so in conjunction with additional fundamental research to improve their chances of success.
6. Investors using the AAII screens should have the necessary time, interest, and skills to devote to the process.

In conclusion, although we do find support for AAII's statement that 91% of their screened portfolios beat the S&P 500, we note that this overstates the effectiveness of their screens, as many of the return differences are not statistically significant, their return analysis ignores transactions costs, and the S&P 500 may not be the appropriate benchmark for all of the AAII strategies. Accounting for this, we find that about 20% of all portfolios and 25% of the low transaction portfolios significantly beat their best-fit indices. Although these numbers are less spectacular, we agree with AAII that many of their screens may be a good starting point in the portfolio selection process.

Notes

1. http://www.aaii.com/benefits/howtoprofit/.
2. See for instance Ritter (1991), Ikenberry, Lakonishok and Vermaelen (1995), Loughran and Ritter (1995), Michaely, Womack and Thaler (1995), Spiess and Affleck-Graves (1995), and Desai and Jain (1997).
3. See for instance Odean (1998), Barber and Odean (2000 & 2002), and Huberman (2001).
4. Note Choi (2000) implicitly assumes returns related to size, BTM, momentum, and earnings surprises are not abnormal.
5. Our comparisons are with the index values provided by AAII. Individual investors may invest in many of these indices via ETFs. We found exact ETF matches for eight of the AAII indices. For six AAII indices there are near matches. Only two of the AAII indices could not be associated with any ETF. The indices for which no associated ETFs were identified are the All ADRs index and the All Exchange Listed Stocks index.
6. The eliminated portfolios are the Shadow Stock Screen, the Short % Outstanding, the Short Interest Change, the Short Ratio, the Dual Cash Flow Revised, the Driehaus, and the Inside Net Purchases portfolios.
7. The portfolios eliminated under this condition are the Dremen Revised, the All DRPs, the Est. Revised Down Lowest 30, the Est. Revised Up Top 30, and the Low Price to Book Universe portfolios.
8. A table including the variable values and statistics for each class can be obtained upon request from the authors.
9. The results reported for this analysis are for comparisons using the S&P 500 Price Change index. We use the price change index because AAII does not include dividends in its return calculations. Results from comparisons using S&P 500 Total Return index are virtually the same.
10. Sixty of the AAII portfolios have data for the seven year period beginning in January of 1999. An analysis of these 60 portfolios produced results similar to those obtained using only the 54 portfolios for which the full eight years of data is available. Fifty-three of the 60 portfolios (86.89%) outperformed the S&P 500 over the seven-year period.
11. A complete list of portfolios, associated indices, and the Sharpe ratios of each may be obtained from the authors.
12. Our analysis also does not consider taxes. We assume investments are made through a tax-deferred or tax-exempt account such as an IRA. Paying taxes on multiple short-term gains would greatly reduce the returns to these strategies.
13. AAIIs Discount Broker Guide shows there are at least eight online brokers that provide trades for $7.00 or less. Of these, Scottrade is probably the most widely recognized firm. In addition, some online brokers provide lower commissions for frequent traders or investors with high balances.
14. In reality commissions would be semi-variable costs, since the number of stocks passing the screen each month would vary. In addition, investors may not have to

rebalance every security each month if the monthly closing value is close to the anticipated rebalanced percentage. As noted above, the actual portfolio turnover, based on the AAII data, of every portfolio is less than 100%. By potentially overstating commissions, we offset the potential overstatement of performance arising from our omission of spreads and slippage.

15. Both the Dogs of the Dow Low Priced 5 and the Graham Enterprising Investor portfolios hold five stocks, whereas the Estimated Revisions Down portfolio contains 191 stocks.
16. We also performed our tests assuming a $20,000 initial investment. In this analysis, 30 of the 54 portfolios exhaust their funds and run out of money during the sample period. Of the 24 portfolios that finish the sample period with positive dollar balances, only 18 finish with balances in excess of the original $20,000, and of these 18, only 12 finish with balances in excess of $25,727, the value achieved by a hypothetical investment in the S&P 500 Price Change index. The 12 screens that outperformed the S&P 500 represent 22.22% of the 54 portfolios tested.
17. Under the $100,000 scenario, the two portfolios running out of money are the Estimated Revisions Down (191 securities) and Estimated Revisions Up (168 securities) portfolios. As expressed early, the trading costs are extremely detrimental to portfolios with a large number of securities.
18. The mathematics of multiplication tell us that, without transaction costs, the cumulative returns and the dollar accumulations would be the same for a portfolio regardless of the order in which the numbers are multiplied. However, when we include transaction costs in our analysis, the return sequence may impact the total balances accumulated. To determine the impact of the return sequence we reverse its order. We assume that the first return is the December 2005 return and that the last return is the return from January 1998. This change has little impact on the results, as the balances accumulated in both the $50,000 and $100,000 scenarios are very similar to those in the original tests.
19. We also examined sub-samples of firms with holdings below the 75^{th} and 90^{th} percentiles. The percentages of firms beating their benchmarks in these sub-samples fall between those for the full sample and below median sample. In the interest of space, these results are not tabulated, but are consistent with the notion that high transaction cost portfolios are less likely to outperform benchmarks.
20. For this analysis, we report results for the S&P 500 Total Return index. Comparisons to this index are slightly more conservative, as the returns to the Total Return index are always higher than those of the Price Change index. The results obtained using the Price Change index are similar to those reported here.

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