

A Baldrige Portfolio: Does Quality Outperform The Market?

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Abstract

This paper investigates the claim, by the Department of Commerce, that a portfolio of Baldrige National Quality Award winners outperforms the market. They find that there is a 92 percent return for Baldrige winners as compared to a 33 percent return on the S&P 500 index. Their results are published and used to promote "quality" in Department of Commerce press releases. Our findings do not support their claim that investors can handsomely outperform the market by investing in a Baldrige portfolio. We find that their study is sensitive to risk measurement and that extending the time horizon alone eliminates any advantage. Our examination of long-run stock price performance of Baldrige firms also does not support their claim of outperforming the market.

Introduction

A perennial¹ question in industry is whether there is a financial return to firms that invest in total quality. The National Institute of Standards and Technology (NIST), the agency in the Department of Commerce which administers the Malcolm Baldrige National Quality Award, has provided studies that attempt to measure the stock return for Baldrige award winning firms. The methodology employed by NIST is to measure a hypothetical investment of \$1,000, invested in each publicly traded firm that won the Baldrige Award, on the first business day in April of the year in which the firm won the award. NIST finds that there is a 92 percent return for Baldrige winners as compared to a 33 percent return on the S&P 500 index.

The results of the NIST study are published and used to promote "quality" in Department of Commerce press releases. The Department claims that the "Baldrige Index is a winner" and that their "study demonstrates that a quality approach to running a business can be financially profitable." However, originally NIST was created to promote U.S. economic growth by working with industry to develop and apply technology, measurements and standards.

The purpose of this study is to provide a detailed examination of the long-run stock price performance of Baldrige winners surrounding their award announcements. This study contributes to both quality management and market efficiency literature by providing insight on whether investors can outperform the market by investing in a portfolio of Baldrige winners (Baldrige Portfolio) following their award announcements. Additionally, this paper contributes to the literature that has employed financial analysis to study firm performance with regard to management techniques. For instance, Bannister (1990) and Clayman (1987) investigated the "In Search of Excellence" phenomenon, while Kleiman (1999) investigated Economic Value Added (EVA).

The paper is organized as follows: we first describe the data sample followed by a section on research design and results in two phases. First, in Phase I, we replicate and extend the time horizon of the NIST

Readers with comments or questions are encouraged to contact the authors via email.

¹ Earlier versions of this paper were presented at the 1999 annual meeting of the Southern Finance Association and the Eastern Finance Association respectively.

portfolio and compare the results with different benchmark measures of performance. Second, in Phase II we examine the long-run stock performance of Baldrige firms, both preceding and following their award announcements. The final section provides conclusions.

Sample

We identified the population of Baldrige winners from the website of National Institute of Standards and Technology (NIST) at www.quality.nist.gov/docs/winners. There were 31 Baldrige awards over the ten-year period of 1988 through 1997. A list of the Malcolm Baldrige National Quality Award winners is presented in Table 1. Ten of the Baldrige winners are privately held companies, and hence they are excluded from our analysis. There are 21 Baldrige awards in our final sample.

Research Design and Results

The analysis of this study is composed of two phases. The first phase is basically a replication and an expansion of the NIST study. In other words, we examine the percentage changes in the stock prices of Baldrige winners following their award announcements. The second phase is to examine the long-run risk-adjusted stock price performance of the portfolio of Baldrige winners surrounding their award announcements.

Phase I

This phase is composed of two parts. First, we replicate the NIST study by following its methodology and using public winning companies over the period of 1988 through 1994. We compute the percentage changes in the stock prices of the Baldrige winners from the first business day in April of the year they won the award (or the date they went public) to October 3, 1994. Adjustments are made for stock splits and/or stock dividends. For comparison, we pair up each Baldrige winner with the Standard and Poor's (S&P) 500 index and compute the percentage change in the index over the holding horizon corresponding to that of the Baldrige winner.

Our findings, presented in column A of Table 2, in general, confirm the findings of the NIST study. The average percentage changes in stock prices for the Baldrige winners and the S&P 500 index are, respectively, 99.4% and 57.4%. Although our results show a smaller margin, the conclusion is qualitatively identical to that of the NIST, which documented an average percentage change in the S&P 500 index of 32.6%. In other words, when the S&P 500 index is used as the benchmark, the Baldrige winners outperform the market. One of our concerns about the research design of the NIST study is their lack of control for risk. In order to investigate our concern, we also replicate their study with the NASDAQ index, in place of the S&P 500 index, as the benchmark because some of the winning companies are listed on the NASDAQ. The result of this investigation indicates that the margin of the Baldrige winners over the market vanishes. The average percentage change in the NASDAQ index over the holding horizons corresponding to those of the Baldrige winners is 95.4%, which is only 4% lower than that of the Baldrige award winners. This shows that the relative performance of the Baldrige winners is highly sensitive to the choice of the benchmark index, suggesting that the results and conclusions of the NIST study are subject to risk mismeasurement.

The second part of Phase I expands the first part by examining Baldrige award winners over the period of 1988 through 1997. We follow the same methodology except extending the holding horizon to July 1, 1998. The results of this analysis, which are presented in column B of Table 2, further question the claim of the NIST study that the Baldrige winners outperform the market. In this expanded analysis, the average percentage change in stock prices for Baldrige winners, the S&P 500 index and the NASDAQ index are, respectively, 208.9%, 349.6% and 423.7%. These findings suggest that Baldrige winners fail to outperform the market, even when a more conservative S&P 500 index is used as the benchmark.

The inclusion of the NASDAQ index in Phase I of our analysis sheds some light on the importance of controlling for risk in the analysis. However, we have not explicitly controlled for the riskiness of the Baldrige winners in our Phase I analysis. In addition, all Baldrige winners share the same ending date, however, they may have differ-

ent beginning dates in the computation of the percentage change in stock price; therefore, the methodology used by NIST, as well as in Phase I of this study, allows different Baldrige winners to have different holding horizons. This makes the interpretation of the average percentage change in stock prices of Baldrige winners less intuitive. In response to these concerns, we develop the second phase of our analysis.

Phase II

Kothari and Warner (1997) show that there are biases in measuring long-run excess returns according to the CAPM and the traditional market model. In addition, Barber and Lyon (1997) argue that the use of the common index as the benchmark portfolio in measuring long-run excess returns will lead to misspecified test statistics. In the same study, Barber and Lyon show that matching sample firms by similar size and book-to-market ratios yields well-specified measures of long-run excess returns. Besides, Fama and French (1992) find that both the firm size and market-to-book ratio are better risk measures than stock beta in explaining cross-sectional stock returns. Thus, we construct control firm portfolios for the Baldrige award winners by matching the industry, defined according to the 4-digit SIC code, and the firm size or the market-to-book ratio of Baldrige winners at the fiscal year end preceding their award announcements. In Phase II of this study, three control firm portfolios are constructed as the benchmark for detecting risk-adjusted abnormal holding period returns (AHPR) of the Baldrige winners. Two of them are industry and firm size matched. We use market value of equity (MVE) and book value of total assets (TA) as proxies for firm size. The third control firm portfolio is matched by industry and the market-to-book ratio (MB). The firm size or the market-to-book ratio of the control firm is within 50% to 150% of the value of the corresponding variable for the Baldrige winner. Following the suggestion of Canina, Michaely, Thaler and Womack (1998), we use monthly returns to avoid potential upward biases associated with compounded daily returns in measuring returns of the portfolios over an extended horizon.

In order to gain a full picture of the market performance of Baldrige winners, we examine their long-run stock price performance both preceding and following their award announcements. We examine the abnormal holding period returns (AHPRs) of Baldrige winners over 12-month, 24-month and 36-month holding horizons surrounding their award announcements. In other words, the post-award analysis includes the (+1,+12), (+1,+24) and (+1,+36) horizons while the pre-award analysis includes the (-12,-1), (-24, -1) and (-36,-1) horizons, where the event month t is defined as the calendar month relative to the announcement month ($t = +1$). In this phase, we lost another observation because two divisions of AT&T won the awards in the same year (1992). We also lost one observation due to no data available for Zytec, a Baldrige winner in 1991 on COMPUSTAT. As a result, our final sample for Phase II has 19 observations.

Conrad and Kaul (1993) show that cumulative abnormal returns that are computed according to a rebalancing strategy tend to overstate the true abnormal returns. This upward bias increases with the number of periods accumulated. In addition, Barber and Lyon (1997) recommend that long-run abnormal returns should be calculated as the long-run buy-and-hold return of a sample firm less the long-run buy-and-hold return of an appropriate benchmark of matching firms. In order to reduce the potential biases in measuring long-run abnormal returns, we follow a buy and hold strategy in computing holding period returns for both the Baldrige winners and their control firms. For the Baldrige winners, the L -month holding period return for winner j , HPR_{jL} , is defined as:

$$HPR_{jL} = \prod (1+R_{jt}) - 1$$

where L is the length of the holding period, which has a value of 12, 24 or 36, respectively, for both the pre-award and post-award analyses, and

R_{jt} is the monthly rate of return on stock j for event month t relative to the announcement month ($t = +1$).

If the Baldrige winner stops trading at any time prior to the end of the holding period, its return for the rest of the holding period is assumed to be equal to the return of the respective control firm to avoid survival biases in the analysis.

We compute the L-month holding period return for the control firm in a similar fashion. In other words, R_{jt} in the above equation is replaced by the monthly rate of return on the respective control firm, C, for event month t in computing the L-month holding period return for the control firm, HPR_{cL} . Then we compute the abnormal holding period return by subtracting the holding period return of the respective control firm from that of the Baldrige winner over the corresponding holding horizon. In other words, the L-month abnormal holding period return for firm j with control firm C, $AHPR_{jcL}$, is defined as:

$$AHPR_{jcL} = HPR_{jL} - HPR_{cL}$$

The long-run risk-adjusted stock price performance of the Baldrige winners is measured by the sample means and medians of the abnormal holding period returns (AHPR) over various holding horizons surrounding their award announcements.

The results of Phase II of our analysis are presented in Table 3. First, we observe that in comparing the results across columns, the AHPRs generally vary with the choice of benchmarks. For a given time period the signs and magnitude vary with the control firms. Second, there are signs that the Baldrige winners perform better than the control firms during the 12-month period immediately preceding (-12,-1) the award announcement. The AHPRs are largest and the signs are consistently positive across various control firms. This result cannot be attributed to public information prior to the award announcement, since applications for the award and site visits are kept confidential. It is also interesting to note that, during the 12-month period immediately following their award announcements, the Baldrige winners seem to perform worse than their control firms. Finally, the results are not statistically significant, and they appear to be driven by a few outliers in the sample, especially for the sample mean statistics. This is a common problem that is found with small samples with substantial dispersion.

Summary and Conclusions

In general, our findings do not support the claim of NIST that investors can handsomely outperform the market by investing in a portfolio of Baldrige award winners. In Phase I, we find that a Baldrige Portfolio has a holding period return of 99%, as compared to the S&P 500 index of 57%. This finding, which replicates the NIST study, supports their claim that the Baldrige Portfolio outperforms the market over the period from 1988 through 1994. However, risk is not explicitly taken into account. When we add the NASDAQ index, we find the holding period return is 95%, which is only 4% lower than that of the Baldrige Portfolio. This result indicates that the margin of the Baldrige Portfolio is highly sensitive to the choice of the benchmark, suggesting that the results and conclusions of the NIST study are subject to risk mismeasurement.

Additionally, in Phase I, we extend the holding period horizon to cover the period 1988 through 1997 and follow the same methodology. The results of this analysis further question the claim of the NIST study that the Baldrige Portfolio outperforms the market. In this expanded analysis, the holding period returns for the Baldrige Portfolio, the S&P 500 index, and the NASDAQ index are, respectively, 209%, 350% and 424%. These findings suggest that the Baldrige Portfolio fails to outperform the market, even when a more conservative S&P500 index is used as the benchmark.

In Phase II, we examine abnormal holding period returns of the Baldrige winners over 12-month, 24-month and 36-month holding horizons surrounding their award announcements. Three control firm portfolios are constructed as the benchmark for detecting risk adjusted AHPRs of the Baldrige winners. Among our findings is that the AHPRs are sensitive to the benchmark control firm portfolios. There are results that suggest that Baldrige winners perform better than the control firms during the 12-month period preceding the award and experience stock price underperformance in the 12-month period after the award. The 12-month period prior to the award is not influenced by public information, since applications for the award and site visits are kept confidential. Finally, the results are not statistically significant, and they appear to be driven by a few outliers in the sample, which is a common problem with small samples with substantial dispersion.


Overall, our results do not support the claim of NIST that investors can outperform the market by investing in a portfolio of Baldrige award winners. Furthermore, a department of the federal government is poorly advised in taking an advocacy position regarding portfolios for investors, and apparently they are poorly equipped in the analytical techniques to engage in portfolio research. The NIST study implies that “quality pays.” We believe that it is more appropriate to confine the findings solely to implications regarding Baldrige award winners, and that a Baldrige Portfolio does not apparently outperform the market. Our results do not necessarily carry implications regarding quality management or whether “quality pays,” other than for firms that win the Baldrige award. 

Table 1. A List of the Malcolm Baldrige National Quality Award Winners: 1988 to 1997

<u>Company Name</u>	<u>Award Year</u>	<u>Firm Status</u>	<u>Market Value</u>
Globe Metallurgical Inc.	1988	Private	
Motorola Inc.	1988	Public	\$ 6,432 MM
Westinghouse Electric Corporation	1988	Public	\$ 7,141 MM
-- Commerical Nuclear Fuel Division			
Milliken & Company	1989	Private	
Xerox Corporation	1989	Public	\$ 6,004 MM
-- Business Products & Systems			
General Motors Company	1990	Public	\$ 25,590 MM
-- Cadillac Motor Car Company			
Federal Express Corporation	1990	Public	\$ 2,461 MM
IBM	1990	Public	\$ 54,093 MM
-- AS/400 Division			
Wallace Co., Inc.	1990	Private	
Marlow Industries, Inc.	1991	Private	
Solectron Corporation	1991	Public	\$ 68 MM
Zytec Corporation	1991	Public	NO DATA
AT&T Network Systems Group	1992	Public	\$ 51,228 MM
-- Transmission Systems Business Unit			
AT&T	1992	Public	\$ 51,228 MM
-- Universal Card Services			
Granite Rock Company	1992	Private	
The Ritz-Carlton Hotel Company	1992	Private	
Texas Instruments Inc.	1992	Public	\$ 2,525 MM
-- Defense Systems & Electronics Group			
Ames Rubber Corporation	1993	Private	
Eastman Chemical Company	1993	Public	\$ 3,924 MM
AT&T	1994	Public	\$ 71,000 MM
-- Consumer Communications Services			
GTE Directories Corporation	1994	Public	\$ 33,311 MM
Wainwright Industries, Inc.	1994	Private	
Armstrong World Industries	1995	Public	\$ 1,435 MM
-- Building Products Operations			
Corning Telecommunications	1995	Public	\$ 6,817 MM
-- Products Division			
ADAC Laboratories	1996	Public	\$ 203 MM
Custom Research, Inc.	1996	Private	
Dana Commercial Credit Corporation	1996	Public	\$ 2,969 MM
Trident Precision Manufacturing, Inc.	1996	Private	
Merrill Lynch & Company	1997	Public	\$ 13,373 MM
Minnesota Mining & Manufacturing Company	1997	Public	\$ 34,597 MM
Solectron Corporation	1997	Public	\$ 1,962 MM

Table 2
Raw Stock Price Performance of Malcolm Baldrige Award Winners:
A Replication and Expansion of the NIST's Study

<u>Column B Expansion</u>			<u>Column A – Replication</u>		
(Closing on 7/1/1998)			(Closing on 10/3/1994)		
<u>Sale</u>	<u>Percentage</u>	<u>Investment</u>	<u>Purchase</u>	<u>Sale</u>	<u>Percentage</u>
<u>Company Name</u>	<u>Return (%)</u>	<u>Date</u>	<u>Price</u>	<u>Price</u>	<u>Return (%)</u>
Motorola Inc.		4/4/1988	\$ 11.125	\$ 52.625	373.0
\$ 52.9375	375.8				
Westinghouse Electric Corporation		4/4/1988	\$ 25.5625	\$ 12.875	(49.6)
\$ 28.3025	10.8				
Xerox Corporation		4/3/1989	\$ 60.25	\$106.00	75.9
\$103.4376	415.6				
General Motors Company		4/2/1990	\$ 45.50	\$ 46.25	1.6
\$ 68.50	50.5				
Federal Express Corporation		4/2/1990	\$ 55.375	\$ 61.25	10.6
\$ 62.9375	13.7				
IBM		4/2/1990	\$105.875	\$ 68.875	(34.9)
\$116.75	120.5				
Solelectron Corporation		4/1/1991	\$ 4.1875	\$ 26.25	526.9
\$ 44.00	2,001.5				
Zytec Corporation		11/11/1993	\$ 10.375	\$ 11.25	8.4
NO DATA					
AT&T Network Systems Group		4/1/1992	\$ 40.375	\$ 53.375	32.2
\$ 56.75	40.6				
AT&T Universal Card Services		4/1/1992	\$ 40.375	\$ 53.375	32.2
\$ 56.75	40.6				
Texas Instruments Inc.		4/1/1992	\$ 32.00	\$ 66.125	106.8
\$ 60.00	650.0				
Eastman Chemical Company		1/4/1994	\$ 45.25	\$ 53.625	18.5
\$ 61.375	36.0				
AT&T		4/4/1994	\$ 51.00		
\$ 56.75	11.3				
GTE Directories Corporation		4/4/1994	\$ 30.75		
\$ 56.25	82.9				
Armstrong World Industries		4/3/1995	\$ 45.50		
\$ 67.9375	49.3				
Corning Telecommunications		4/3/1995	\$ 36.00		
\$ 34.875	(3.1)				
ADAC Laboratories		4/1/1996	\$ 17.375		
\$ 22.125	27.5				
Dana Commercial Credit Corporation		4/1/1996	\$ 33.50		
\$ 54.4375	62.5				
Merrill Lynch & Company		4/1/1997	\$ 43.75		
\$ 96.125	119.7				
Award Winners' Portfolio Average Percentage Return					99.4%
208.9%					
Standard & Poor's 500 Index Average Percentage Return					57.4%
349.6%					
NASDAQ's Composite Index Average Percentage Return					95.4%
423.7%					

Table 3
Long Term Abnormal Holding Period Returns (AHPR) of Baldrige Winners Surrounding Their Award Announcements

Holding Period	Cum. Return	A. Market-to-Book Ratio			B. Market Value of Equity			C. Total Assets		
		N	Median	Mean	N	Median	Mean	N	Median	Mean
(-36, -1)	1.4425	19	-0.0087	-0.0735	19	-0.0256	0.0165	19	0.0282	0.0834
(-24, -1)	1.3217	19	-0.0408	-0.1664	19	0.0331	0.0402	19	-0.0060	0.0139
(-12, -1)	1.2023	19	0.2092	0.1311	19	0.1197	0.1229	19	0.0886	0.0376
(+1, +12)	1.2091	16	-0.0508	0.0188	16	-0.0110	0.0546	16	-0.0170	0.0443
(+1, +24)	1.6296	14	0.1455	0.1334	14	-0.0348	0.1868	14	-0.0501	0.1508
(+1, +36)	1.8691	12	0.1458	0.4490	12	0.2114	0.4162	12	-0.0618	0.4548

Notes:

t = +1: The award announcement month.

Cum. Return: The raw cumulative holding period returns of the Baldrige winners over the various holding periods.

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Notes