Do companies investing in high-quality employee wellness programs outperform the stock market? Evidence from the Koop Award winners

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ABSTRACT

The C. Everett Koop National Health Award (Koop Award) is conferred annually by The Health Project, a nonprofit organization founded in 1994, to promote employer achievements in cost-effectively improving the health of their employees. This paper finds that the monthly stock returns of Koop Award winners outperform both the monthly value-weighted market return and the S&P 500 monthly return index for the years 1994 through 2015. Further, to control for the effect of risk on stock returns, risk-adjusted excess returns are calculated based upon both the CAPM model and the Fama-French three factor model. The Koop Award winners are found to have significantly positive risk-adjusted excess returns. This paper also shows that Koop Award winners outperform their peers with similar firm characteristics using the propensity score matching method. In sum, the paper provides empirical evidence consistent with the idea that firms with high quality employee wellness programs are more likely to have employees with better health and workforce performance, resulting in superior stock price performance for these firms.

Keywords: Health Care Costs, Investment Returns, Risk-Adjusted Returns, Propensity Score Matching, and Koop National Health Award.

INTRODUCTION

The C. Everett Koop National Health Award (Koop Award) was created to promote employer achievements in improving employee health in a cost-effective manner and is conferred annually by The Health Project, a nonprofit organization founded in 1994. The award recognizes organizations that have met rigorous outcomes criteria and documented improved health of plan participants. Significantly, these improvements in employee's health must be accompanied by a decrease in medical costs. The award also pays tribute to companies working hard to develop programs that encourage better health habits and an improved understanding of how to use health services more efficiently. The objective of this research is to investigate whether firms with wellness programs that are successful in winning the Koop Award will also be attractive investment vehicles for investors. The justification for this hypothesis is the expectation that well-developed wellness programs will result in improved health, happiness, motivation, and workforce performance of the firm's employees. With improved health, it is also expected that the reduction in medical expenditures will benefit the firm's bottom line and ultimately the investment performance of the firm.

LITERATURE REVIEW

As health care costs have risen for decades, there has been increased interest by the sponsoring companies to identify ways to control those costs. One example of this interest is provided by research done by James T. Prior (1993) in which he found that in the 16 years prior to 1993, health care costs in the United State had risen by 2,100 percent and were currently in the $750 billion range. Most alarming he found that those costs were expected to rise by 100 percent in the following 7 years. He also found that approximately 96 percent of health care dollars were spent on treatment and only 4 percent were spent on prevention.

One way of dealing with rising medical care costs is to develop wellness programs. As an example of the financial implications of wellness programs for an individual company, Prior cited the Johnson & Johnson Corporation (J&J) whose wellness program had cost the company approximately $225 per employee. The company found that the program had saved the company $156 in reduced absenteeism and $223 per employee in reduced medical costs, generating a net savings to the corporation of $154 per employee.

While investigating employee health programs, O'Rourke and Sullivan (2003) found that sixty-one percent of adults in the United States are overweight or obese, according to the Surgeon General and the Centers for Disease Control and Prevention. Their research looked at a number of firms that had developed wellness programs to help them reduce health care costs and increase employee productivity. In addition to possible financial benefits to the firms, the firms sponsoring the programs anticipated an improvement in their company image, easier recruitment of quality employees, a reduction in turnover/absenteeism, and fewer job injuries. Examples of the financial impact of wellness programs cited in their research were the $4.50 reduction of medical expenses for every dollar invested by Citibank and the $3.93 in medical expenses saved for every dollar invested in their wellness programs by Motorola.

Other work looking into the financial impact of wellness programs was done by Tully and Davis (1995). They also looked at Johnson and Johnson which had spent approximately $4.5 million a year on preventative health programs and estimated that their medical bills would be higher by about $13 million a year (or 15% higher) without their programs. They also looked

at the 12 most recent Koop Award winners and concluded that most were chosen for the award because their wellness plans offered a range of services and generated the biggest savings.

Bolch (2012) found that a key part of a successful wellness program was the offering of incentives to employees for participation in the programs. He found that participation in health assessments and programming nearly doubled when incentives are offered. A wellness plan consulting firm named Mercer was cited in the Bloch research. Mercer found that its numerous clients averaged between $2 and $3 savings for each dollar expended, beginning three to five years after their programs is started.

An award competing with the Koop Award is the Corporate Health Achievement Award (CHAA) which is awarded annually by the American College of Occupational Medicine since 1996. It defines excellence as reducing health and safety risks and demonstrating positive impacts upon a business. Fabius, et.al. (2013) assumed an investment of $10,000 in the publicly traded CHAA award winners and compared the portfolio's performance to the S&P 500 stock index performance from 1999 to 2012. They found that under all assumptions tested, the CHAA award winners easily outperformed the S&P 500 portfolio by an approximately 99% gain in portfolio value versus a negative .8% loss for the S&P 500 portfolio over the time-period studied.

Similar methodology to the Fabius work was done by Goetzel, et. al. (2016) two years later when they compared a Koop Award winner portfolio to the S&P 500 portfolio. They found that the Koop Award winner's stock values appreciated 325% over the years 2000 to 2014 compared to the 105% appreciation of the S&P 500 portfolio. However, they did not explicitly consider the possible effects of risk on the performance of the stock portfolios.

In summary, previous research into the financial implications of wellness programs support the idea that firms benefit in a number of ways by creating quality wellness programs and very importantly they have the potential to benefit firms financially. But it is not clear whether the better stock price performance as documented in prior research is driven by higher risk faced by Koop Award Winners. This research explores more rigorously the wisdom of investing in Koop Award winners by explicitly considering the aspect of risk. CAPM model, Fama and French three factor model, and propensity score matching are used to calculate different versions of risk-adjusted excess returns.

DATA, RESEARCH METHODOLOGY AND EMPIRICAL RESULTS

The sample of Koop Award winners for the period 1994-2015 includes 38 award winners from domestic U.S. companies with available data in the CRSP and COMPUSTAT databases. Foreign owned firms, private firms, and nonprofit organizations without publicly traded stocks are excluded from the sample. As a result, there are no winners included in the sample for the years 2006, 2012, 2013, and 2014. Also, some companies won the Koop Award more than once during the sample period.[1] The 38 award winners come from 29 unique companies. The monthly excess return of winners (r_e) is calculated as follows:

Equation 1 $r_e = r_{winner} - r_{vw}$

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[1] The companies that won the Koop Award more than once include Champion International Corporation, Union Pacific Railroad, Pitney Bowes, Aetna, Citibank, and Dow Chemical Company. Please see Table 5 (Appendix) for the complete list of sample firms.

where r_{winner} is the monthly stock return of Koop Award winners and r_{vw} is the monthly value-weighted market return. The Standard & Poor's 500 market index ($r_{S\&P\ 500}$) is used as a benchmark to calculate excess returns using the formula,

Equation 2 $$r_e = r_{winner} - r_{S\&P\ 500}$$

As argued before, companies having outstanding workplace health promotion programs are expected to reduce health costs, improve worker productivity, and ultimately their common stock will outperform the overall stock market. The monthly excess return of winners (r_e) is expected to be positive and statistically significant.

Panels A, B and C of Table 1 (Appendix) show the monthly stock returns of Koop Award winners and market indexes over a three-year and a five-year period, respectively. Panel A shows descriptive statistics of monthly stock returns from one year before winning the Koop Award to one year after. For example, Texas Instrument won the award in 1998 and its monthly stock returns during the 3-year period 1997-1999 (i.e., 36 monthly-return observations) are included in the sample. As reported in Panel A of Table 1 (Appendix), the average monthly stock return of Koop Award winners over the three-year period is 1.41% while the monthly value-weighted market return is 0.87% and the monthly return of the S&P 500 market index is 0.72%.

In Panel B and C of Table 1 (Appendix), the test period of monthly stock returns is extended to five years and seven years, respectively. Specifically, Panel B reports descriptive statistics of monthly stock returns of award winners from two years before receiving Koop Award to two years after (i.e., 60 monthly return observations). The mean of monthly stock return of winners during this period is 1.43%, while the mean of the value-weighted market return and S&P 500 are 0.95% and 0.78%, respectively. Similar results are reported in Panel C where returns are calculated during a seven-year period (i.e., 84 monthly return observations). The mean of monthly stock return of winners during this period is 1.40%, while the mean of the value-weighted market return and S&P 500 are 0.95% and 0.78%, respectively.

Panel D of Table 1 (Appendix) reports the statistical significance of excess returns defined by Equation 1 and 2. The *t*-test is used to examine the significance of average excess returns and the Wilcoxon sign-rank test is used to examine the significance of the medians. The means and medians of excess returns are both positive and significant when calculated over the three-year, five-year and seven-year periods. In summary, these empirical findings in Table 1 (Appendix) indicate that on average Koop Award winners outperform the market portfolio by approximately 0.5% to 0.7% per month, or 6.0% to 8.4% per year. As such, the excess returns of Koop Award winners are both statistically and economically significant.

Risk-Adjusted Excess Returns

While Table 1 (Appendix) reports better stock price performance of Koop Award winners than the market, it does not control the risk associated with Koop Award winners. Thus, the positive excess return of award winners reported in Table 1 could be a result of higher risk faced by Koop Award winners. To address this concern, this paper also estimates risk-adjusted excess returns based on two models-the CAPM model and the Fama-French three-factor model.

First, risk-adjusted excess returns (α) are estimated based upon the CAPM model as follows (i.e., Jensen's alpha):

Equation 3 $$\alpha = r_{winner} - [r_f + \beta\ (r_m - r_f)]$$

where r_f is the one-month Treasury bill return (i.e., risk-free return), r_m is the value-weighted market return, and β shows the systematic risk of a security. After rearranging Equation 3, α and β can be estimated using the following regression model,

Equation 4 $$r_{winner} - r_f = \alpha + \beta\,(r_m - r_f)$$

The constant in equation 4 (the α), captures the risk-adjusted excess return for the Koop Award winners after adjusting the market risk based upon the CAPM model. α is expected to be significantly positive if companies with outstanding employee health promotion programs have superior stock market performance.

Additionally, to estimate the excess return per unit of systematic risk Treynor Measure is calculated as follows:

Equation 5 $$T = (\,r_{winner} - r_f\,)\,/\,\beta$$

Fama and French (1993, 1995 and 1996) show that in addition to market returns, firm size and the market-to-book ratio are also important risk factors that significantly affect a firms' common stock return. Thus, risk-adjusted excess returns (α) for Koop Award winners based on the Fama-French three-factor model are estimated as follows:

Equation 6 $$\alpha = r_{winner} - [r_f + \beta_1\,(r_m - r_f) + \beta_2\,SMB + \beta_3\,HML]$$

where SMB is the return of a portfolio long in small stocks and short in big stocks and HML is the return of a portfolio long on high book-to-market stocks and short in low book-to-market stocks. Data of SMB and HML is downloaded from Dr. Kenneth French's website (French, 2016). α and βs are estimated using the following regression model:

Equation 7 $$r_{winner} - r_f = \alpha + \beta_1\,(r_m - r_f) + \beta_2\,SMB + \beta_3\,HML$$

Again, the risk-adjusted excess return of winners (α of Equation 7) is expected to be positive and statistically significant.

The estimated risk-adjusted excess returns based upon the CAPM and Fama-French three-factor models are reported in Table 2 (Appendix). Panel A reports the coefficient estimates of the pooled regression based on Equations 4 and 7, over a three-year period (reported in columns 1 and 2), a five-year period (reported in columns 3 and 4), and a seven-year period (reported in columns 5 and 6). The estimates of risk-adjusted excess returns are captured by the constants of the regression models. In Panel A constants of all the six specifications are positive and statistically significant at 5% significance level or better. Specifically, when the monthly return of award winners is estimated over a 3-year period (in columns 1 and 2), the risk-adjusted excess returns of winners (i.e., Jensen's α) are 0.64% and 0.52% based on the CAPM model and Fama-French three-factor model, respectively. When the estimation period of monthly returns is extended to a 5-year period as shown in columns 3 and 4, the risk-adjusted excess returns of winners are 0.57% and 0.41% based on the CAPM model and Fama-French three-factor model, respectively. When measured over a 7-year period (in column 5 and 6), risk-adjusted excess returns of winners are 0.54% and 0.38% based on the CAPM model and Fama-French three-factor model, respectively. In addition, the coefficient of β from the CAPM model which captures the systematic risk is less than one for all the different estimation periods (estimates of β are 0.90 in column 1, 0.92 in column 3, and 0.90 in column 5), indicating that the portfolio of Koop Award winners on average has lower systematic risk than the market portfolio. The estimates of α reported in Panel A are based on a pooled regression of all the award winners. Thus they capture the risk-adjusted excess return of a portfolio of all the award winners.

Panel B of Table 2 (Appendix) reports the mean and median of estimates of risk-adjusted excess returns for the 38 award winners when risk-adjusted returns are estimated individually for each of the 38 Koop Award winners. The mean and median of the risk-adjusted excess return of

Koop Award winners are significantly positive based on the t-test and Wilcoxon sign-rank test. When estimated over a 3-year period, the mean of α is 0.57 and 0.48 for the CAPM model and Fama-French three factor model, respectively. And the median of α is 0.62 and 0.52, respectively. When estimated over a 5-year period, the mean of α is 0.53 and 0.54 for the CAPM model and Fama-French three factor model, respectively. And the median of α is 0.50 and 0.43, respectively. When estimated over a 7-year period, the mean of α is 0.59 and 0.53 for the CAPM model and Fama-French three factor model, respectively. And the median of α is 0.49 and 0.42, respectively. These firm-specific estimates of α are similar in magnitude to the estimates of α based on the pooled regression in Panel A, providing further support of the hypothesis that firms with excellent health and wellness programs have superior stock market performance.

Based on the firm-specific regression of Equation 4, the average of the Treynor measure for the 38 award winners is calculated and reported in Panel C of Table 2 (Appendix). The average Treynor measure for the 38 Koop Award winners is 1.52 over a 3-year period, 1.61 over a 5-year period, and 2.03 over a 7-year period. They are significantly higher than the Treynor measure of the whole market, indicating that the investment returns of Koop Award winners' portfolios per unit of systematic risk are higher than the market average.

In summary, the estimates of risk-adjusted excess return (i.e., α) reported in Panels A and B of Table 2 (Appendix) are positive and significant both economically and statistically. They are consistent with the hypothesis that firms focusing on employee health and well-being exhibit better stock market performance. Furthermore, these estimates are of similar magnitude and are comparable to the excess returns reported in Table 1 (Appendix). Collectively, it is reasonable to conclude that the positive excess returns for Koop Award winners reported in Table 1 cannot be attributed to different levels of risk.

Matched-Sample Analysis: Propensity Score Matching

Koop Award winners could be potentially different from non-winners in terms of size, leverage and any other firm characteristics. As documented in prior literature (e.g., Fama and French (1993)), firm size is an important factor that affects firms' stock returns. Other firm characteristics such as leverage, proportion of short term debt, and profitability could also affect a firm's stock returns. To control for the effects of firm characteristics on stock return, matched-sample analysis is conducted in calculating excess returns of Koop Award winners. First, a "best match" is found for each Koop Award winner. The best match is a non-winner industry peer of the award winner and has the most similar firm characteristics with the award winner. Then the stock return of the best-matched firm is viewed as an alternative benchmark in calculating the excess return for the award winner. In other words, the excess return of the award winner is calculated as the difference of the stock return between the award winner and its best match. Since the award winner and its best-matched firm have the most similar firm characteristics, the effects of firm characteristics on stock returns are mitigated.

To find the best matches for Koop Award winners, this paper uses the propensity score matching method. This method was developed by Rosenbaum and Rubin (1983 and 1985) and extended by Heckman, Ichimura, and Todd (1997). Compared with other matching methods, propensity score-matching methods provide a natural weighting scheme (i.e., the propensity score) that yields unbiased estimates of treatment effects. In the context of this research, winning the Koop Award could be viewed as the treatment. The treatment effect is the difference of monthly stock return between an award winner and its return if it had not invested in an

employee's wellness program successfully enough to win the Koop Award. Obviously the latter course of action by the firm is counterfactual and its hypothesized stock return cannot be observed. As such, the best matched firm is used as a substitute.

To find the best match for each Koop Award winner, the propensity scores are calculated by estimating the following Probit model,

Equation 8   Prob (Winner = 1) = Φ(β_1 Size + β_2 Leverage + β_3 MB ratio + β_4 Prop short + β_4 Profitability + Year dummies+ Industry dummies +ε.)

where "Winner" is a dummy variable, which is equal to one if the firm is a Koop Award winner and is equal to zero if the firm is a non-winner, Φ is the normal cumulative distribution function, "Size" is the book value of assets, "Leverage" is the book value of total debt divided by the market value of assets. The market value of assets is estimated as the book value of assets minus the book value of equity plus the market value of equity, where MB ratio is the market value of assets divided by the book value of assets, "Prop short" is a firm's debt that matures within one year divided by total debt, and "Profitability" is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to the book value of total assets. Industry dummies are based on Fama and French 48 industry classifications. Note that only industries with Koop award winners are included. For example, companies in the smoke tobacco products industry are excluded from the regression estimation because there is no Koop Award winner in this industry.

Based on the coefficient estimates of Equation 8, propensity scores are calculated for all sample firms. For each Koop Award winner, its best match is a non-winner firm in the same industry with the closest propensity score with the Award winner.

Next, the excess returns of award winners are recalculated using the return of its best match (denoted as $r_{matched}$) as the benchmark, referred to as score-matched excess return. Specifically, the score-matched excess return for the Koop Award winner is calculated as

Equation 9 $r_e = r_{winner} - r_{matched}$

This paper expects the score-matched excess return to be positive and significant.

Table 3 Panel A (Appendix) shows the descriptive statistics of the firm characteristics of 566 firm-year observations of Koop Award winners and 86,913 other firm-year observations with available data in CRSP and COMPUSTAT databases (i.e., non-winners). Compared to non-winners, Koop Award winners generally have a bigger size. Their total assets are $15,393 million on average, while the average of non-winners is $110 million. Koop Award winners also have lower MB ratio, suggesting that winners are most likely to be mature companies. Additionally, Koop Award winners have better profitability. Their EBITDA-to-total assets is 0.13 on average, compared with -0.09 for non-winners, supporting the hypothesis that companies focusing on employee health and well-being can improve employee productivity and, in turn, have better performance as measured by accounting earnings.

Panel B of Table 3 (Appendix) reports the estimates of Probit model. Firm size and the proportion of short term debt are significantly positively correlated with being a winner. Table 5 reports the best match for each winner during the award year. Since firm characteristics are varying over time, the best match for a company could be different in a different year. For example, Citibank won the Koop Award in 1998 for the first time and its best match in that year is JP Morgan Chase, while in 2001 when Citibank won the award for the second time, its best match is Washington Mutual. In addition, about 90% (34 out of 38) of the best matches of winners have employee wellness programs in place. As such, the score-matched excess return captures the difference in stock return between two firms that have similar firm characteristics, but differ in the quality of their employee wellness programs.

The monthly stock returns of Koop Award winners and their matched firms are reported in Table 4 (Appendix). Panel A shows descriptive statistics of monthly stock returns from one year before Koop Award to one year after. The average monthly stock return of winners during the 3-year period is 1.37% while the monthly return of matched companies is 0.86%. Additionally, the average and the median of the score-matched excess returns are 0.53% and 0.34%, respectively. Panel D also shows that the average of score-matched excess return over the 3-year period is positive and significant at the 10% level (t value = 1.74).

Panel B of Table 4 (Appendix) shows the descriptive statistics of stock returns over a 5-year period. The average monthly stock return of Koop Award winners is 1.37% while the monthly return of matched companies is 0.85%. The average and the median of score-matched excess return are 0.52% and 0.51%, respectively. As reported in Panel D, the mean and the median over the 5-year period are both positive and significant at the 5% level (t value = 2.12, Z value = 2.24).

Panel C of Table 4 (Appendix) shows the descriptive statistics of stock returns over a 7-year period. The average score-matched excess return is positive and increases when measured over the 7-year horizon. The mean and the median over the 7-year period are both positive and significant at the 1% level (t value = 2.88, Z value = 2.80).

Evidence from the matched-sample analysis provides further support for the hypothesis that companies winning the Koop Award exhibit superior stock price performance, as measured over different periods of time before and after receiving the Koop Award.

CONCLUSION

In this paper the stock market performance of Koop Award winners is examined. Prior research on this topic generally documents better stock returns of Koop Award winners. However, prior research does not consider the effect of risk and hence it is not clear whether winners' higher returns are driven by higher risk faced by these firms. This paper finds empirical support that Koop Award winners have superior stock price performance when risk is explicitly considered. Risk is controlled in a variety of ways in this study; CAPM model, Fama and French three factor model, and propensity score matching are used to calculate different versions of risk-adjusted excess returns. These findings contribute to the literature by showing that higher stock returns of award winners cannot be attributed to different levels of risk.

Winning the Koop Award, of course, is not a natural experiment to test effects of wellness programs on a firms' performance. Due to the greater resources available to them, large and successful companies are more likely to invest in the health and well-being of their employees and receive the award. This possible endogeneity issue is mitigated by the use of propensity score matching method, since the best matches identified by this method have the most similar size and profitability along with other characteristics as the award winners.

The majority of the matched firms also have employee wellness programs in place, although their programs are typically not as well developed and effective as those of Koop Award winners. Therefore, the positive and significant score-matched excess return as documented in this paper captures the positive influence of implementing a very high quality, cost-effective employee wellness program. This research provides empirical evidence that very high quality employee wellness programs can improve employee health and workforce performance, resulting in superior stock price performance.

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APPENDIX

Table 1. Monthly stock returns of Koop Award winners and market indexes

The sample includes the monthly stock returns of 38 Koop Award winners from year 1994 to 2015 using available data from the CRSP and COMPUSTAT databases. Monthly stock return data is obtained from CRSP database. r_{winner} is monthly stock return of Koop Award winners, r_{vw} is monthly value-weighted market return, and $r_{S\&P\ 500}$ is monthly return of Standard & Poor's 500 market index. Panel A shows the descriptive statistics of monthly stock returns from one year before receiving the award to one year after. For an Award winner of year t, monthly stock returns from year t-1 to year t+1 are included (i.e., 36 observations). Panel B and C show the descriptive statistics of stock returns from two years before the award to two years after, and three years before the award to three years after, respectively. Panel D reports the statistical significance of the mean and median of excess returns of Award winners over 3-year, 5-year and 7-year horizons using t-tests and Wilcoxon sign-rank tests, respectively. t values and Z values are reported in the parentheses. All the variables including excess returns are winsorized at 1% and 99% percentiles of the full sample to reduce the impact of outliers. ***, ** and * are used to denote significance at the 1% level, 5% level, and 10% level, respectively..

Panel A. Descriptive statistics of monthly stock returns over a 3-year period

Variables (percentage)	Mean	Median	StdDev	Quartile1	Quatile3	Observations
r_{winner}	1.41	1.28	8.45	-3.41	6.11	1,298
r_{vw}	0.87	1.52	4.36	-2.05	3.95	1,298
$r_{S\&P\ 500}$	0.72	1.22	4.29	-2.01	3.63	1,298

Panel B. Descriptive statistics of monthly stock returns over a 5-year period

Variables (percentage)	Mean	Median	StdDev	Quartile1	Quatile3	Observations
r_{winner}	1.43	1.32	8.57	-3.38	6.11	2,143
r_{vw}	0.95	1.52	4.27	-1.84	3.95	2,143
$r_{S\&P\ 500}$	0.78	1.15	4.19	-1.98	3.61	2,143

Panel C. Descriptive statistics of stock returns over a 7-year period

Variables (percentage)	Mean	Median	StdDev	Quartile1	Quatile3	Observations
r_{winner}	1.40	1.23	8.51	-3.41	6.11	2,954
r_{vw}	0.95	1.55	4.24	-1.84	3.95	2,954
$r_{S\&P\ 500}$	0.78	1.15	4.16	-1.91	3.61	2,954

Panel D. Monthly stock performance of Koop Award winners based on t-tests and Wilcoxon sign-rank tests

Excess Returns (Percentage)	$r_{winner} - r_{vw}$		$r_{winner} - r_{S\&P500}$		Observations
	Mean	Median	Mean	Median	
3-year period	0.55***	0.45**	0.70***	0.56***	
	(2.73)	(2.21)	(3.52)	(3.07)	1,298
5-year period	0.49***	0.39**	0.65***	0.51***	
	(3.10)	(2.45)	(4.14)	(3.62)	2,143
7-year period	0.46***	0.31***	0.62***	0.47***	
	(3.38)	(2.57)	(4.65)	(4.00)	2,954

Table 2. Risk-adjusted excess returns of Koop Award winners

The sample includes the monthly stock returns of 38 Koop Award winners from year 1994 to 2015 calculated with available data in the CRSP and COMPUSTAT databases. Panel A reports pooled regression estimates of equation (4) and (7). The dependent variable in all specifications is $r_{winner} - r_f$, where r_{winner} is monthly stock return of Koop Award winners, r_f is the one-month Treasury bill return (i.e., risk-free return). r_m is monthly value-weighted market return, SMB is return of a portfolio long in small stocks and short in big stocks, and HML is the return of a portfolio long on high book-to-market stocks and short in low book-to-market stocks. Robust standard errors are in parentheses. Panel B reports the mean and median of the risk-adjusted excess returns of Koop Award winners estimated based on firm-specific regressions for equations (4) and (7), for each of the 38 award winners. The statistical significance of the mean and median are based on t-tests and Wilcoxon sign-rank tests, respectively. t values and Z values are reported in the parentheses. Panel C compares the average Treynor Measure between Koop Award winners and market. All the variables are winsorized at 1% tails measured using the full sample to reduce the impact of outliers. ***, ** and * denote significance at the 1% level, 5% level, and 10% level, respectively.

Panel A. Pooled regression estimates based on CAPM and Fama-French three factor model

	3-year period		5-year period		7-year period	
	(1)	(2)	(3)	(4)	(5)	(6)
r_m-r_f	0.895***	1.011***	0.915***	1.003***	0.903***	0.999***
	(0.051)	(0.052)	(0.043)	(0.044)	(0.036)	(0.037)
SMB		-0.119*		-0.004		0.002
		(0.069)		(0.064)		(0.054)
HML		0.373***		0.328***		0.344***
		(0.078)		(0.064)		(0.055)
Jensen's α	0.643***	0.518**	0.565***	0.409**	0.542***	0.376***
	(0.204)	(0.203)	(0.162)	(0.163)	(0.139)	(0.140)
Observations	1,298	1,298	2,143	2,143	2,954	2,954
R-squared	0.235	0.265	0.228	0.245	0.221	0.239

Panel B. Mean and median of risk-adjusted excess returns estimates based on firm-specific regressions

Average risk-adjusted excess return, α (Percentage)	CAPM		Fama & French		Observations
	Mean	Median	Mean	Median	
3-year period	0.57***	0.62***	0.48**	0.52***	
	(3.37)	(3.44)	(2.56)	(2.94)	38
5-year period	0.53***	0.50***	0.54***	0.43***	
	(4.07)	(3.44)	(3.18)	(3.17)	38
7-year period	0.59***	0.49***	0.53***	0.42***	
	(5.02)	(4.34)	(3.67)	(3.33)	38

Panel C. Comparison of average Treynor Measure between Koop Award winners and the market

Treynor Measure	Winners	Market	Difference	Observations
3-year period	1.52	0.58	0.95***	
			(3.25)	38
5-year period	1.61	0.65	0.95***	
			(3.43)	38
7-year period	2.03	0.63	1.40***	
			(2.97)	38

Table 3. Propensity score matching

The sample includes 87,479 firm-year observations of U.S. domiciled public firms that are in the intersection of COMPUSTAT and CRSP with relative information available. Size is the book value of assets. Leverage is the book value of total debt [dltt+dlc] divided by the market value of assets, where the market value of assets is estimated as the book value of assets after tax minus the book value of equity [ceq] plus the market value of equity [prcc_f*csho]. MB ratio is the market value of assets divided by the book value of assets. Prop short is a firm's debt that matures within one year [dd1] divided by total debt [lt]. Profitability is the ratio of earnings before interest, taxes, depreciation, and amortization (EBITDA) to the book value of total assets. Panel A shows comparison of firm characteristics between Koop Award winners (566 firm-years) and other firms (86,913 firm-years). Panel B reports the regression estimates of Probit model, where the dependent variable is a dummy variable and Winner indicates whether the firm won the Koop Award. All data are converted to real values in 2015 dollars using the monthly consumer price index. Firm-specific variables are winsorized at the 1% tails measured using the full sample to reduce the impact of outliers. Robust standard errors are in parentheses. *** Corresponds to significant at 1%; **significant at 5%; * significant at 10%.

Panel A. Comparison of firm characteristics between Koop Award winners and other firms.

| | Award winners | | Other firms | |
	Mean	Median	Mean	Median
Size (in millions)	15,393	17,121	110	109
Leverage	0.169	0.131	0.147	0.090
MB ratio	1.867	1.529	2.806	1.398
Prop short	0.032	0.017	0.041	0.008
Profitability	0.130	0.126	-0.091	0.052
Number of firm years	566		86, 913	

Panel B. Probit regression

	Winner
Log(Size)	0.757***
	(0.021)
Leverage	-0.283
	(0.194)
MB ratio	-0.022
	(0.021)
Prop short	2.047***
	(0.378)
Profitability	-0.350
	(0.358)
Constant	-8.852***
	(0.288)
Industry dummies	Yes
Year dummies	Yes
*O*bservations	87,479
Pseudo R-squared	0.469

Table 4. Monthly stock returns of Koop Award winners and matched firms

The sample includes the monthly stock returns of U.S. domiciled public firms that are found in both the COMPUSTAT and CRSP databases. Monthly stock returns come from CRSP database. r_{winner} is monthly stock return of Koop Award winners, $r_{matched}$ is monthly stock return of matched firms in the same industry according to Fama and French 48 industry classification. Panel A shows the descriptive statistics of stock returns from one year before the award to one year after, Panel B shows the descriptive statistics of stock returns from two years before the award to two years after, Panel C shows the descriptive statistics of stock returns from three years before the award to three years after and Panel D shows stock performance of award winners based t-tests and Wilcoxon sign-rank tests. t values and Z values are reported in the parentheses. All the variables including excess returns are winsorized at 1% tails measured using the full sample to reduce the impact of outliers. ***, ** and * are used to denote significance at the 1% level, 5% level, and 10% level, respectively.

Panel A. Descriptive statistics of monthly stock returns over a 3-year period

Variables (percentage)	Mean	Median	StdDev	Quartile1	Quatile3	Observations
r_{winner}	1.37	1.20	8.51	-3.43	6.07	1,184
$r_{matched}$	0.86	1.00	10.47	-4.71	6.54	1,184
$r_{winner} - r_{matched}$	0.53	0.34	10.37	-5.40	5.86	1,184

Panel B. Descriptive statistics of monthly stock returns over a 5-year period

Variables (percentage)	Mean	Median	StdDev	Quartile1	Quatile3	Observations
r_{winner}	1.37	1.20	8.81	-3.47	6.09	1,858
$r_{matched}$	0.85	0.83	10.28	-4.60	6.37	1,858
$r_{winner} - r_{matched}$	0.52	0.51	10.80	-5.24	6.13	1,858

Panel C. Descriptive statistics of monthly stock returns over a 7-year period

Variables (percentage)	Mean	Median	StdDev	Quartile1	Quatile3	Observations
r_{winner}	1.41	1.19	8.86	-3.43	6.15	2,425
$r_{matched}$	0.82	0.97	10.04	-4.40	6.14	2,425
$r_{winner} - r_{matched}$	0.60	0.45	10.17	-4.87	5.91	2,425

Panel D. Monthly stock performance of Koop Award winners based t-tests and Wilcoxon sign-rank tests

Score-Matched Excess Returns (Percentage)	$r_{winner} - r_{matched}$		Observations
	Mean	Median	
3-year period	0.53*	0.34	
	(1.74)	(1.36)	1,184
5-year period	0.52**	0.51**	
	(2.12)	(2.24)	1,858
7-year period	0.60***	0.45***	
	(2.88)	(2.80)	2,425

Table 5. Sample information

Winner	Award year	Ticker	SIC code	Matched firms
AETNA	1994	AET	6311	LOEWS CORP
CHAMPION INTERNATIONAL CORP.	1994	CHA	2435	STONE CONTAINER CORP
DOW CHEMICAL COMPANY	1994	DOW	2812	DU PONT (E I) DE NEMOURS
QUAKER OATS COMPANY	1994	OAT	2043	KELLOGG CO
UNION PACIFIC RAILROAD	1994	UNP	1081	NORTHWEST AIRLINES CORP
HONEYWELL	1995	HON	3483	THERMO FISHER SCIENTIFIC INC
MARRIOTT	1995	MAR	7011	MCDONALD'S CORP
PACIFIC BELL	1995	PAC	4811	TWENTY-FIRST CENTURY FOX INC
CHAMPION INTERNATIONAL CORP.	1996	CHA	2435	FORT JAMES CORP
PITNEY BOWES	1996	PBI	3579	GATEWAY INC
PACIFIC BELL	1997	PAC	4811	CBS CORP -OLD
TRIGON BLUE CROSS BLUE SHIELD AND SUBSIDIARY HEALTH MANAGEMENT CORP.	1997	TGH	8399	CINCINNATI FINANCIAL CORP
UNION PACIFIC RAILROAD	1997	UNP	4011	CSX CORP
APPLIED MATERIALS	1998	AMAT	3550	BRUNSWICK CORP
CITIBANK	1998	C	6153	JPMORGAN CHASE & CO
LILLY'S CORPORATE HEALTH SERVICES/ELI LILLY AND CO.	1998	LLY	2834	PHARMACIA CORP
PITNEY BOWES	1998	PBI	3579	WESTERN DIGITAL CORP
TEXAS INSTRUMENTS	1998	TXN	3674	NORTHROP GRUMMAN CORP
AETNA	1999	AET	6324	LOEWS CORP
CATERPILLAR INC.	2000	CAT	3531	DEERE & CO
CIGNA CORP.	2000	CI	6331	LOEWS CORP
CITIBANK	2001	C	6211	WASHINGTON MUTUAL INC
NORTHEAST UTILITIES	2001	NU	4911	CONECTIV INC
UNION PACIFIC RAILROAD	2001	UNP	4011	NORTHWEST AIRLINES CORP
FEDEX CORP.	2002	FDX	4513	UNITED PARCEL SERVICE INC
MOTOROLA SOLUTIONS INC.	2002	MSI	3663	INTEL CORP
JOHNSON & JOHNSON	2003	JNJ	2834	ABBOTT LABORATORIES
UAW-GM	2004	GM	3711	FORD MOTOR CO
UNION PACIFIC RAILROAD	2005	UNP	4011	BURLINGTON NORTHERN SANTA FE
PEPSI BOTTLING GROUP	2007	PBG	2086	PEPSIAMERICAS INC
WE ENERGIES	2007	WEC	4911	EL PASO CORP
DOW CHEMICAL COMPANY	2008	DOW	2821	DU PONT (E I) DE NEMOURS
INTERNATIOANL BUSINESS MACHINES	2008	IBM	3571	MICROSOFT CORP
ALLIANCE DATA SYSTEMS CORP	2009	ADS	7389	MAGELLAN HEALTH INC
PFIZER, INC.	2010	PFE	2834	MERCK & CO
EASTMAN CHEMICAL	2011	EMN	2821	CELANESE CORP
PRUDENTIAL FINANCIAL	2011	PRU	6311	METLIFE INC
MCKESSON CORPORATION	2015	MCK	5122	INGRAM MICRO INC