

The Long-Run Performance of Firms Adopting Compensation Plans Based on Economic Profits

Chris Hogan
Owen Graduate School of Management
Vanderbilt University
Nashville, Tennessee 37203
chris.hogan@owen.vanderbilt.edu

Craig Lewis
Owen Graduate School of Management
Vanderbilt University
Nashville, Tennessee 37203
craig.lewis@owen.vanderbilt.edu

May, 2000

The authors thank seminar participants at University of Arizona, Ohio State University, Southern Methodist University, and Vanderbilt University; especially Bill Christie, Gerald Garvey, Tim Loughran, and Ron Masulis. The authors also would like to thank Stephan Schulze for capable research assistance.

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Abstract: Proponents of compensation plans based on economic profits argue that these plans control for deficiencies in stock-based or earnings-based bonus plans and thereby better align managers' and shareholders' interests. We examine whether compensation plans based on economic profits do in fact produce better investment decisions. We use a sample of 51 firms adopting economic profit plans between 1986 and 1994 to examine compensation, ownership, and governance structures, and long-run operating and stock price performance. While we document significant improvements in operating performance subsequent to adoption of the compensation plans, a sample of nonadopting matched firms shows similar significant improvements. There is no significant difference in the stock price performance of the two groups in the four-year period following an adoption. We conclude that economic profit plans are no better than traditional plans that provide a blend of earnings-based bonuses and stock-based compensation in terms of their ability to create shareholder wealth.

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Most executive compensation plans include features designed to induce managers to make efficient investment decisions. These include earnings-based bonuses and stock ownership (including employee stock ownership plans, restricted stock, phantom stock, and stock options). One of the more recent innovations is plans that reward managers for generating economic profits in excess of a charge for the amount of invested capital.

Plans that compensate managers on the basis of economic profits have become increasingly popular, with adoption by blue-chip companies that include Boise Cascade Corp., the Coca-Cola Company, Eli Lilly & Co., and Monsanto. The management consulting firm of Stern Stewart and Co. is the leading advocate of the economic profit approach, which it markets under the name of Economic Value Added (EVA™). Other consulting firms such as the Boston Consulting Group and KPMG design similar plans.

Economic profit plans (EPPs) attempt to compensate for deficiencies in other types of incentive plans. Stock ownership plans have the advantage that they motivate managers to improve share prices, but stock price changes reflect changing market conditions and only partially the efforts of managers. Earnings-based compensation schemes have an advantage in that they are based directly on accounting numbers, which can be evaluated at the divisional level. The disadvantage is that earnings plans tend to induce a short-term orientation; moreover, they are based on accounting numbers that are subject to manipulation, and they fail to adjust for operating risk. Proponents of EPPs argue that their plans control for many of these deficiencies because they focus on cash flows rather than accounting earnings, yet appropriately adjust for capital costs.

If EPPs provide managers with incentives to make better investment decisions, firms that adopt such plans should experience improved long-run stock price and operating performance.¹ Stern Stewart and Co. claims that “more than 300 client companies worldwide now use EVA, and evidence shows that most of them significantly outperform other companies in their industries.” The firm argues that there are three ways for EPP firms to increase value:

“Increase the returns from the assets already in the business by running the income statement more efficiently without investing new capital; invest additional capital and aggressively build the business so long as expected returns on new investments exceed the cost of capital; and release capital from existing operations, both by selling assets that are worth more to others and by increasing the efficiency of capital by such things as turning working capital faster and speeding up cycle times.”²

¹ Academic studies of EPP adopters focus on short-term performance. Wallace (1997) provides evidence that managers make operating and investment decisions that produce higher levels of economic profits in the year following the adoption of an EPP. Biddle, Bowen, and Wallace (1997) suggest that stock prices respond more to traditional earnings than economic profits. Lehn and Makhija (1997) show that CEO turnover is lower in firms that have higher levels of economic profits. Although the results of these studies are suggestive, the ultimate success of an EPP can be measured only by examining operating and stock price performance over longer time periods.

² Information obtained from the Stern and Stewart website on September 24, 1999. See www.sternstewart.com.

In essence, an appropriately designed EPP should provide incentives for improving investment performance by linking executive compensation to value creation (economic profits).

Following the methodology in Loughran and Ritter (1997), we examine the long-run stock return and operating performance of firms adopting EPPs in four-year periods prior to and following plan adoption.³ We find that the operating performance of companies adopting EPPs, as measured by numerous accounting measures, significantly improves in the year of and in the four-year period following plan adoption.

The median return on assets (ROA) increases from 3.5 percent in the fiscal year prior to adoption to 4.7 percent four years later. Median operating income-to-total assets rises from 15.8 percent to 16.7 percent in four years. The median market-to-book ratio increases from 2.10 to 2.85. Significant improvements also are realized in the year of adoption. These increases suggest that firms adopting EPPs realize dramatic long-run improvements in operating performance.

Closer examination of the adopting firms indicates that they are relatively poor performers prior to adoption of these plans, however, and that the improved stock return and operating performance may not be unique to EPP adopters. When we examine the operating performance of a sample of nonadopter firms in similar industries that are comparable in size and profitability, we find operating performance that is statistically indistinguishable from the adopting firms. We also find similar stock performance. EPP and control firms, respectively, earn 18.6 percent and 23.4 percent on an annualized basis in the four years following adoption, which is comparable to the 21.9 percent return on the value-weighted NYSE-AMEX-NASDAQ stocks over the same period.

There are two possible explanations for the similarity in stock return and operating performance improvements between the adopters and nonadopters. First, the improvements may reflect a return to historical performance levels, and have nothing to do with managers' actions. That is, managers may be opportunistically adopting EPPs to coincide with predictable changes in operating performance. For example, if a poorly performing firm is likely to revert to the industry mean, managers may adopt an EPP to cash in on the anticipated increases in economic profits. Similarly, EPP adoption may be motivated by predictable increases in economic profits that are caused by industrywide innovation.⁴

A second possible explanation is that the performance improvements are the result of improved incentive alignment. The evidence, however, suggests instead that an EPP represents one method to realign incentives, but traditional approaches that combine earnings-based bonuses and equity participation may be equally effective.

We attempt to distinguish between these alternative explanations by examining the associations between operating performance changes and changes in the compensation,

³ Studies by Loughran and Ritter (1997) and Lewis, Rogalski, and Seward (1999) examine the long-run operating performance of firms that have issued common equity and convertible debt.

⁴ This explanation is consistent with recent findings of Yermack (1997), who documents that CEO stock option awards are timed to immediately precede announcements of favorable corporate news. In this manner, the timing of stock option awards is similar to opportunistic timing of EPP adoptions.

ownership, and governance structures of adopting and control firms. While we find numerous changes in the year of adoption, the changes are very similar across all firms.

For example, bonus payments increase 39.1 percent in the adoption year for EPP firms, but bonus payments also increase 37.4 percent for control firms. Thus, firms respond to poor recent performance by strengthening the link between bonus payments and performance, but the basis for calculating bonus payments, whether by economic profits or earnings, has little impact on the actual increase in shareholder value relative to nonadopting firms.

These results are not consistent with the opportunistic adoption hypothesis. If opportunism were the motivation for EPP adoption, it would be easier to modify bonus payments under the current plan rather than make a highly visible change like adopting an EPP.

Given the similarities in firm compensation, ownership, and governance structures, the improvements in operating performance suggest that EPPs are no worse than but certainly no better than alternative incentive-based compensation plans. Thus, we conclude that the recent popularity of products like Stern Stewart's EVATM simply reflects impressive marketing, rather than a new and different way to motivate managers.

The remainder of the paper is organized as follows. After we discuss our hypotheses in section 2, we describe our data sources and sample selection procedure in section 3. In section 4, we examine the compensation, ownership, and governance structures of our sample of firms. In section 5, we evaluate both pre-adoption and post-adoption operating performance of firms that adopt EPPs, and provide comparison operating performance measures for a matched sample of comparison firms. Discussion in section 6 examines the relation between operating performance and the compensation, ownership, and governance structures. We show that, regardless of the nature of the compensation structure, incentive compensation affects long-term operating performance positively. We thus conclude that there are many ways to motivate managers to change operating and investment strategies, and all are equally effective. The relation, investigated in section 7, between stock price performance and operating performance for adopting firms and the comparison firms confirms this conclusion. In section 8, we summarize and conclude.

2. Theory and Hypotheses Development

When there is asymmetric information, and managerial effort is unobservable, managerial discretion can lead to inefficient investment decisions. Shareholders recognize that these conditions create adverse incentives and take actions to align managers' interests with their own. This alignment can be accommodated in a number of ways, which may include: (1) creating an independent board of directors to increase the level of monitoring, (2) designing capital structures to minimize the agency costs of managerial discretion and debt, (3) modifying executive compensation plans by adding performance bonuses and equity participation, and (4) concentrating stock ownership.

Our goal is to examine whether compensation plans based on economic profits have the effect of producing better investment decisions. We first examine the structure of the compensation plans, and also the ownership and governance structures for both our sample

of EPP adopters and the comparison firms. We expect higher levels of earnings-based compensation to result in more profitable operations, regardless of the nature of the compensation plan. In addition, higher levels of equity-based compensation and increased share ownership by top executives should lead to improved growth opportunities and superior stock price performance. If EPPs outperform traditional plans, we would expect to see stronger performance as a consequence of the changed compensation structure, all else equal.

Since the long-run benefits of an EPP may not be immediately observable, the success of EPPs needs to be considered over longer time horizons. Short-term tests that focus on changes in the year following adoption suggest that managers respond to the incentives to increase economic profits (see Wallace, 1997). This finding is an important first step, but the larger question we seek to address here is whether these incentives produce lasting benefits.

If EPPs encourage efficient investment decisions, an adopting firm should have better long-run operating performance in the period following the adoption than in the pre-adoption period. Adopters should also outperform other firms in the same industry that have traditional compensation plans.

Similarly, the investment decisions that follow EPP adoptions should produce better long-run stock performance in the period following the adoption than in the pre-adoption period. Adopters should also in this regard outperform others in their industry that have traditional compensation plans.

3. Sample Description and Data Sources

The sample consists of all adoptions of economic profit plans during the 1988-1994 period. The initial sample of EPP adopters was obtained based on a keyword search of proxy statements on the *LEXIS/NEXIS* database. The keywords used to perform this search are: Economic Value Added, EVA, Residual Income, Economic Value Management, Economic Profit, Value Based Management, and Market Value Added. We read proxy statements for each company and year identified by the search to ensure that the firms did in fact adopt an EPP. In some cases, we had to read prior years' proxy statements before we could determine the year of adoption of the plan. In addition, we compared our adoption years with those listed in the Wallace (1997) study for any of the sample firms appearing in both studies. Regulated utilities (SIC = 481 and 491-494) and financial institutions and their holding companies (SIC = 600-699) are excluded from the final sample. Since our study uses accounting-based measures of operating performance, we also require that the adopting company appear on the Compustat Annual Research Tapes in the year of the EPP adoption. These industry and data restrictions result in a final sample of 51 firms. The Appendix lists the adopting companies and the comparison firms.

Summary information on the number of EPP adopters by year and industry affiliation is provided in Table 1. The number of adoptions has increased every year since 1989, which reflects the increasing popularity of this type of compensation plan. Panel B of Table 1 provides two-digit SIC codes for our sample. EPP firms represent a broad cross-section of industries, suggesting that EPPs are considered a useful tool for motivating managers in a variety of business activities.

We report throughout firm-specific and industry-adjusted operating performance results for EPP firms in order to compare adopting firms and nonadopting firms matched on the basis of industry affiliation, firm size, and operating performance. This approach allows us to detect meaningful changes in operating performance that are unrelated to simple mean reversion.

We follow the procedure recommended by Barber and Lyon (1996) and implemented by Loughran and Ritter (1997) in a study of the operating performance of firms that issue seasoned equity. Specifically, we match each EPP firm in the year of adoption with a comparison firm that has not previously adopted an EPP according to an algorithm as follows:

- (1) If there is at least one nonadopter in the same two-digit industry with end-of-year assets within 25% to 200% of the EPP firm, the nonadopter with the closest Operating Income Before Depreciation/Total Assets (OIBD/Assets) ratio to that of the adopter is chosen as the matching firm.
- (2) If no nonadopter meets this criterion, then all nonadopters with adoption year assets of 90% to 110% of the adopter are ranked, and the firm with the closest, but higher, OIBD/Assets ratio is selected as the matching firm.

This procedure is designed to select a comparison firm on the basis of industry affiliation, asset size, and normalized operating income similarities. We control for operating income, given Barber and Lyon's (1996) finding that test statistics for comparing levels and changes in operating performance are misspecified when comparison firms are not matched on pre-event income performance. Comparison firms must also appear on Compustat, and can be listed on the NYSE, the AMEX, or Nasdaq. Finally, we require that EPP firms and their comparison firms have proxy statements for the year prior to and the year of adoption.

We actually select five potential matches using the above algorithm. In section 5 where we analyze operating performance changes, we replace any control firms that have been delisted with an "alternate" control firm. All potential control firms are selected based on the above algorithm in the year of adoption.

4. Compensation, Ownership and Governance Structures

In this section, we analyze data collected from proxy statements on the compensation, ownership, and governance structures of EPP adopters and the comparison firms.

4.1 Compensation structure

Table 2 provides compensation data for both EPP and comparison firms. Each firm has a complete record for the selected data items. Following Mehran (1995), we collect compensation items including: (1) salary, (2) bonus, (3) other compensation, (4) performance shares and units, (5) restricted stock, (6) phantom stock, (7) dividend units, (8) number of options granted and held, (9) savings plans, (10) properties and insurance, and (11) number

of shares held by executives. The numbers we report include compensation for the CEO and all officers.

We calculate five measures of compensation: (1) percentage of total compensation in salary, (2) percentage of total compensation in bonus, (3) percentage of total compensation in new option grants, (4) percentage of total compensation in stock-based compensation plans, and (5) percentage of total compensation in all equity-based compensation.

Total compensation is the sum of the dollar values of salary, bonus, other compensation, savings plans, properties and insurance, the value of grants of performance shares and units, restricted stocks, phantom stocks, dividend units, and stock options.⁵ The percentage of total compensation that is stock-based is the ratio of the value of grants of performance shares and units, restricted stocks, and phantom stocks to total compensation. The percentage of total compensation that is equity-based is the ratio of the sum of the value of grants of stock options and stock-based compensation to total compensation.

Panel A shows that the average level of cash compensation overall increases in the year of the plan adoption and that officers of EPP adopters receive more cash compensation than officers of comparison firms. EPP officers see their bonuses increase from \$374,693 to \$521,281. Since EPP firms have adopted new bonus plans, this large increase is not particularly surprising. Interestingly, officers in the comparison firms have similar increases in bonus-based compensation - the average bonus increases from \$398,464 to \$547,364.

Panel C indicates that there is little difference in the percentage of total compensation in bonuses. This result foreshadows our primary finding that there are few substantive differences in the compensation structures of adopters and nonadopters. In fact, *t*-tests and median tests (Wilcoxon *z*-scores) indicate that none of these compensation measures is statistically different.

Equity-based compensation also is quite similar for EPP and comparison firms. Panel B indicates that all firms use a wide variety of stock-based compensation, including stock options, performance shares and units, restricted stock, phantom stock, and dividend units. Interestingly, none of the EPP firms uses dividend units, and none of the control firms uses performance shares or phantom stock plans. Although it is not reported here, the median levels for all stock-based compensation variables except stock option grants are zero, which indicates that only stock option plans are regularly used to motivate top executives.

Panel D shows that the CEOs of EPP firms are younger on average (54.2 years) than the CEOs of comparison firms (55.6 years). Also in panel D are the percentages of total shares outstanding in option grants, unexercised options, and current shares held. Total

⁵ Stock options are valued using the Black-Scholes model. To make this calculation, we need the current stock price, the annualized standard deviation of the instantaneous rate of return for the underlying stock, the risk free rate, the exercise price, and the time to maturity. The current stock price is the closing price on the fiscal year-end date. The standard deviation is estimated using daily, continuously compounded returns in the year preceding the option grant. Following Parrino, Borokhovich, and Brunarski (1997), we assume that new grants have five-year maturities. We also assume that new grants are issued at-the-money (the exercise price equals the current stock price). The risk free rate is the annualized yield to maturity for one-month U.S. Treasury bills.

shares outstanding is computed as the sum of total shares outstanding, options granted to top executives, and options held by top executives. The number of shares held by officers (Panel B) and the percentage of shares held by officers (Panel D) are statistically smaller for EPP adopters by either mean or median tests.

4.2 Ownership structure

Table 3 presents summary measures of outside ownership structure. We collect the number of outside blockholders and the percentage of shares they own from proxy statements. Outside blockholders are defined to be shareholders who have equity positions that exceed 5% of the outstanding equity and are required to file a Schedule 13-d with the SEC. Panel A indicates that, compared to the control firms, EPP adopters have slightly more outside blockholders, and that these blockholders control larger positions.

4.3 Governance structure

Table 3 also presents corporate governance measures. We collect proxy information regarding the number and affiliations of board members. Panel B shows that EPP adopters have larger boards and a significantly higher percentage of independent directors. Adopters have 9.6 members in the year of adoption, and 71.7 percent are independent. Comparison firms have 8.6 members, and only 65.4 percent are independent. Given the relatively small levels of managerial share ownership by EPP adopters noted in Panel D of Table 2, appointment of a more independent board may be a response to potentially higher costs of managerial discretion.

The majority of outside directors are employed by manufacturing firms. Board members are also from the ranks of bank-like institutions, investment banks, venture capital institutions, and insurance companies. The remaining outside directors are academicians, former government and military employees, consultants, clergy, and employees of not-for-profit organizations.

5. Operating Performance Changes Surrounding the Adoption of Economic Profit Plans

Table 4 provides comparative operating performance measures for the two groups of firms: EPP adopters and industry-matched nonadopters (comparison) firms. We report median values for four cash flow variables and two investment-related variables. We report median values rather than mean values due to skewness of the data. Results are reported for years -4 through +4, where year 0 is the fiscal year of the EPP adoption. The number of observations is significantly lower for year +4 due to the fact that the 1998 Compustat data was not available at the time we collected this data, and 1998 would be year +4 for the 1994 adopters.

Cash flow operating performance measures include the operating income to assets ratio, profit margin, return on assets, and operating income relative to sales. The cash flow operating performance measures provide evidence on accounting rates of profitability and the efficient use of assets-in-place.

The investment-related operating performance measures include capital expenditures plus R&D expenses relative to total assets and the market-to-book ratio. These measures reflect the rate of incremental long-term investment and the profitability of future growth opportunities. Distinguishing between assets-in-place and growth opportunities is a useful way to differentiate short-run and long-run operating performance changes.

Panel A presents median operating performance measures for adopting firms. The evidence in Panel A suggests that the operating performance of EPP firms generally improves after adopting the plan.

For the median adopter, operating income relative to assets increases to 16.7 percent four years after the adoption compared to 15.8 percent in the year preceding the adoption. Median adopter profit margins also increase. In the year preceding adoption, the median adopter's profit margin is 3.1 percent. It is 5.9 percent four years after the adoption. This increase in profit margin appears to be attributable at least partially to a parallel increase in the adopter's return on assets; return on assets increases from 3.5 percent in the year before adoption to 5.7 percent four years later.

One drawback of these three cash flow operating performance measures is that they are affected by a change in the adopting firm's assets-in-place and/or interest expense. Operating income per dollar of sales is not. Operating income per dollar of sales increases from 11.9 percent in the year before adoption to 14.4 percent four years subsequent to the adoption, which confirms that cash flow operating performance improves following the adoption of an EPP.

Investment-related operating performance measures also improve during the post-adoption period. The median adopter's market-to-book ratio is 2.10 in the year preceding adoption and increases to 2.85 four years after adoption. This suggests that the marginal profitability of the adopter's investment opportunities increases substantially after the adoption of an EPP.

Despite the apparent improvement in the investment opportunity set, reinvestment rates do not change significantly in the post-adoption period. Capital expenditures and R&D expenses increase slightly from 8.6 cents per dollar of assets in the year prior to adoption to 8.7 cents per dollar in the fourth year following the adoption. This finding has no clear interpretation because a well-designed EPP should create better investment incentives, yet it is not obvious whether this should lead to an increase or decrease in capital expenditures. Wallace (1997) argues that firms adopting EPPs may have an incentive to decrease their new investment because of the implicit capital charge.

While these absolute measures indicate that operating performance improves following the adoption of EPPs, an accurate assessment of whether adopters are performing exceptionally well depends on their relative operating performance. Median operating performance results for comparison firms appear in Panel B of Table 4. The adoption year OIBD/Assets ratios are similar for adopters and non-adopters (16.1 percent v. 16.4 percent) because the matching procedure is designed to select comparison firms on the basis of this operating performance measure. Comparison firms' OIBD/assets, profit margin, return on assets, and OIBD/sales all increase during the four years subsequent to the adoption year, much like the results reported in Panel A for the adopter firms. This suggests that the post-

adoption cash flow operating performance of EPP firms is attributable to an industry effect. Alternatively, it could be explained by reversion to industry performance levels since the comparison firms are matched on operating characteristics. That is, an EPP firm that has underperformed the industry will be matched with a comparison firm that also has underperformed.

The investment measures are likewise similar for the comparison firms. Investment expenditures per dollar of assets and the market-to-book ratio exhibit similar behavior to EPP adopters in the four years after the adoption.

Figure 1 plots the adopter and nonadopter median values as reported in Panels A and B of Table 4, for operating income before depreciation, amortization, and taxes, plus interest income/assets, profit margin, and market-to-book. The lighter bars are the EPP adopters, and the darker bars the nonadopters.

Operating performance as measured by OIBD/assets and profit margin deteriorates prior to plan adoption for both adopters and nonadopters. The market-to-book ratio, however, shows steady improvement through the adoption year for both adopters and nonadopters. Although the EPP adopters show evidence of continued improvement over nonadopters following plan adoption, this difference is not statistically significant.

Panel C of Table 4 reports the results of formal statistical tests of the performance differences between the two groups. We compute z -statistics using a Wilcoxon matched-pair signed-rank test to examine the hypothesis that the annual distribution of adopter and nonadopter operating performance measures is identical. A positive (negative) z -statistic indicates that the operating performance measure for the adopter is greater than (less than) the same measure in the same year for the comparison firm.

In years -4 through -1, Panel C suggests that annual operating performance is similar for adopters and comparison firms. The similarity in cash flow and investment-related operating performance continues in the post-adoption period.

The results reported in Panels A, B, and C together indicate that cash flow measures of operating performance increase both for EPP firms and comparison firms during the four-year post-adoption measurement period. The improvement in the cash flow operating performance of EPP firms appears thus to be related to industry effects. Inspection of the investment-related measures of operating performance indicates as well that EPP firms are not significantly different from the comparison firms.

Table 5 provides further evidence comparing pre-adoption and post-adoption operating performance of EPP firms. It reports z -statistics of a Wilcoxon matched-pair signed-rank test examining the hypothesis that the distributions in the performance ratios between pre-adoption and post-adoption periods for EPP firms are equal. Cash flow operating performance measures indicate statistically significantly improved operating performance over the four-year period preceding adoption.

The investment-related measures of operating performance in panel B indicate that investment activity in the post-adoption period, as measured by the ratio of capital expenditures and research and development to assets, is similar to pre-adoption levels.

Incremental investment opportunities, reflected in the market-to-book ratio, by contrast are significantly improved in the post-adoption period.

6. Firm Performance Regressions

The operating performance results are consistent with an argument that improvements in performance may be an industry effect rather than the result of better incentive alignment. It is also possible that the nonadopter firms have responded to poor performance by improving incentive alignment through alternative means (e.g. increasing the bonus and/or equity portion of existing plans). This alternative explanation seems plausible given that we find few differences between the compensation structures of adopters and nonadopters.

We address these issues by examining the relation between measures of operating performance and compensation, ownership and governance structure for both the EPP adopters and the control firms. Given the highly interactive nature of operating performance, we estimate the relation as a system of simultaneous equations using two-stage least squares regression. We weight the observations by the inverse of the standard deviation of the return on equity to control for heteroscedasticity in the independent variables.⁶

Each equation in the simultaneous equation model includes the other two operating performance measures as endogenous variables. For instance, the market-to-book equation includes operating income before depreciation (OIBD)/sales and capital expenditures plus R&D/total assets as endogenous variables. The coefficient estimates for these endogenous variables provide evidence regarding the interaction among these variables. Our results indicate that the endogenous variables have a significant effect on the dependent variables.

The system of equations is:

$$\Delta \text{market-to-book} = f(\text{EPP adopter dummy; percent of total compensation that is equity-based; percent of total compensation that is bonus-based; percent of shares and stock options outstanding held by officers; EPP interaction terms for compensation and ownership variables; percent of shares held by outside blockholders; percent of outside directors; long-term debt/total assets; cash and liquid assets/total assets; standard deviation of operating income; log of total assets; CEO age; } \Delta \text{OIBD/sales; } \Delta [\text{capital expenditures and R\&D}]/\text{total assets})$$

$$\Delta \text{OIBD/sales} = f(\text{EPP adopter dummy; percent of total compensation that is equity-based; percent of total compensation that is bonus-based; percent of shares and stock options outstanding held by officers; EPP interaction terms for compensation and ownership variables; percent of shares held by outside blockholders; percent of outside directors; long-term debt/total assets; cash and liquid assets/total assets; standard deviation of operating income; log of total assets; CEO age; } \Delta \text{market-to-book; } \Delta [\text{capital expenditures and R\&D}]/\text{total assets})$$

⁶ The annualized standard deviation of the return on equity is calculated using daily returns in the fiscal year preceding the EPP adoption.

Δ capital expenditures and R&D/total assets = f(EPP adopter dummy; percent of total compensation that is equity-based; percent of total compensation that is bonus-based; percent of shares and stock options outstanding held by officers; EPP interaction terms for compensation and ownership variables; percent of shares held by outside blockholders; percent of outside directors; long-term debt/total assets; cash and liquid assets/total assets; standard deviation of operating income; log of total assets; CEO age; Δ market-to-book; Δ OIBD/sales)

The intuition that motivates this modeling approach is that firm value equals the sum of the values of assets-in-place and future growth opportunities. We use OIBD/sales and the market-to-book ratio as proxies for the profitability of assets-in-place and the development of growth opportunities. Since future growth opportunities become assets-in-place once an investment is made, we also examine investment activity using the ratio of the sum of capital expenditures and research and development to total assets. In a second estimation that we do not report here, we obtain similar results using return on assets in place of OIBD/sales.

The effectiveness of an EPP is best evaluated by considering the changes in operating performance that follow adoption rather than levels. The change variables are estimated over the two-year period following adoption. We use a two-year period rather than a one-year period because the longer period is more likely to show evidence of changes in compensation structure. Similar results are obtained using three-year changes. The exogenous explanatory variables are measured in the year of adoption.

6.1 Discussion of explanatory variables

Compensation structure: The variables we use to control for the structure of the compensation plan include the percentage of total compensation that is equity-based, the percentage of total compensation that is bonus-based, and CEO age. We also include interaction terms for each variable to evaluate the incremental effects for EPP adopters.

Ownership structure: The variables used to control for ownership structure include the percentage of total shares and stock options outstanding held by key executives and an interaction term to consider the incremental effect for EPP firms. The total shares held by key executives are measured as the sum of shares held by key executives, shares granted through stock options, phantom stock, restricted stock, performance shares, and performance units.

Board structure and independent share ownership: The variables used to control for the structure of the board of directors include the percentage of outside directors and the percentage of shares held by outside blockholders.

Financial structure and operating risk: Shareholders and/or boards of firms with high agency costs may pressure top management to adopt EPPs if they believe that such plans more effectively align the interests of managers and shareholders. We examine proxies for agency costs such as financial slack, leverage firm size, and operating risk. We include three measures of a firm's financial structure: cash and liquid assets to assets; long-term debt to assets; and size. Cash and liquid assets to total assets is a proxy for financial slack. Long-term

debt to total assets measures the amount of financial leverage. This controls for financial risk and the potential agency costs of debt. The size variable is measured as the natural logarithm of total assets. The proxy for operating risk is the standard deviation of operating income to total assets.⁷

6.2 Regression results

Table 6 presents the results of the two-stage least squares estimation of the changes in the market-to-book ratio, OIBD/sales, and capital expenditures plus R&D/total assets. Columns (1), (2), and (3) present the coefficient estimates for the changes in the market-to-book ratio, OIBD/sales, and capital expenditures plus R&D/total assets, respectively. For ease of interpretation, we refer to the change in market-to-book ratio as *new growth opportunities*, the change in OIBD/sales as the *marginal profitability of assets-in-place*, and the change in capital expenditures plus R&D/total assets as *new investment*.

6.2.1 New growth opportunities

Column (1) in Table 6 provides the new growth opportunities specification. The coefficient estimates for the endogenous variables indicate that new growth opportunities are unrelated to the marginal profitability of assets-in-place and positively related to new growth opportunities. That is, new investment creates new growth opportunities.

The explanatory variables consider whether cross-sectional differences in compensation, ownership, and governance structures are associated with the development of new growth opportunities. The percentages of total compensation that are equity- and bonus-based are positively related to changes in growth opportunities, suggesting that incentive compensation motivates top executives to invest in positive net present value projects. However, only the percentage of total compensation that is bonus-based is statistically significant. None of the other ownership and governance structure proxy variables are statistically significant.

Column (1) is consistent with the interpretation that firms with lower managerial discretion costs develop more growth opportunities. New growth opportunities are positively related to long-term debt/total assets and negatively related to cash plus marketable securities/total assets and the log of total assets. This suggests that firms that reduce managerial discretion by distributing free cash flows to bondholders produce more long-run growth opportunities. In addition, small firms that have limited financial slack produce more new growth opportunities.

We also consider whether EPP adopters produce more new growth opportunities than nonadopters. We include an EPP dummy variable that takes the value 1 if the firm adopted an EPP and 0 otherwise. We also report the results from interacting (1) the percentage of total compensation that is equity-based, (2) the percentage of total compensation that is bonus-based, and (3) the percentage of shares and stock options outstanding held by top executives with firms that adopt EPPs. None of the coefficient estimates indicate that there are no significant differences between adopters and comparison firms, which indicates that differences in the compensation and ownership structures of EPP

⁷ Operating risk is estimated as the standard deviation of OIBD/total assets over the nine-year period -4 to $+4$ years surrounding the adoption year.

adopters do not motivate managers to develop growth opportunities any more than managers of other firms.

6.2.2 Marginal profitability of assets-in-place

Column (2) summarizes our results for the change in the OIBD/sales specification. The coefficient estimates for the endogenous variables indicate that the profitability of assets-in-place is unrelated to new growth opportunities. This result is not particularly surprising, since one does not anticipate a strong link between assets-in-place and new growth opportunities. There is a significant negative relation, however, between new investment and changes in OIBD/sales, which suggests that firms that invest heavily are willing to sacrifice short-term profitability for potential long-term improvements.

Unlike our findings for new growth opportunities, compensation and ownership structures are significant determinants of the profitability of assets-in-place. The coefficient estimates for bonus payments and equity ownership by top executives are positively related to improved profitability.

Similar to our previous findings, firms that have smaller managerial discretion costs have greater increases in the profitability of assets-in-place. We show that smaller firms (log of total assets) with greater debt levels (long-term debt/total assets) tend to be more profitable. We also find that firms with riskier operations and more senior leadership post larger improvements in profitability.

As before, we consider whether EPP adopters improve the profitability of the assets-in-place. The EPP dummy variable is positive but insignificantly different from zero. The coefficient estimates for the EPP interaction terms indicate that differences in the compensation structures of EPP adopters do not motivate adopting managers to develop more growth opportunities. We do find a significant difference based on ownership structure in that higher managerial ownership by EPP adopters leads to improved profitability relative to the comparison firms.

6.2.3 New investment

Column (3) in Table 6 summarizes the new investment specification, which is measured as the change in capital expenditures plus R&D/total assets. The coefficient estimates of the endogenous variables indicate that new investment is positively related to new growth opportunities and negatively (but insignificantly) related to the marginal profitability of assets-in-place. This suggests that firms with new growth opportunities invest more, and that the exercise of these growth options has a negative impact on short-term profitability, possibly because expenses are high when projects are started and positive earnings come later in the project's life.

This regression specification shows that EPP adopters invest significantly less than nonadopters. The control firms increase their rate of investment, while EPP adopters significantly scale back investment activity. The reduction in capital spending is likely attributable to the capital charge levied against economic profits that occurs when making bonus calculations. That is, managers have an incentive to sell underperforming assets because a reduction in invested capital boosts economic profits all else equal. The negative

coefficient estimate for the EPP adopter dummy indicates that relative capital spending drops by 10.2% (0.017 – 0.119) following an EPP adoption.

Regression model (3) indicates that the compensation and ownership structures also have a significant impact on capital spending. The percentage of total compensation that is equity-based, the percentage of total compensation that is bonus-based, the percentage of shares and stock options outstanding held by top executives, are all significantly related to new investment. That is, firms that increase investment spending have higher levels of equity- and bonus-based compensation and larger equity stakes.

Interestingly, the conclusions are the opposite for EPP adopters. All of the interaction effects are negative and significant. EPP firms with higher levels of equity-based compensation, bonus-based compensation, and the percentage of shares held by top executives are associated with decreases in capital spending. The net effects respectively are -0.049, -0.060, and -0.204.

Unlike our previous findings, managerial discretion costs do not have a significant impact on new investment activity. We do find a negative relation between new investment and the percentage of shares held by outside investors and a positive relation with the standard deviation of operating income to total assets. This suggests that less risky firms with independent boards invest less than other firms.

7. Operating Performance Changes and Stock Returns

When we examine the long-run stock performance of EPP firms using the same procedures as Loughran and Ritter (1995), we find that post-adoption stock performance results are similar to the operating performance results. EPP firms have better return performance following adoption, but performance is not significantly different from the returns to the market or the comparison firms.

Average annual returns are calculated as an equally weighted average of event (fiscal) year returns for each firm. If a firm is delisted during the measurement time interval, the annual return for that year is computed by splicing in the CRSP value-weighted index returns for the remainder of the year.

Annual stock price returns for adopters and matching firms are provided in Table 7.⁸ Panel A provides average annual returns both for large and small firms separately and, for all firms combined. In the year prior to the offer date, adopters have an average return of 17.5 percent, with a range from 13.2 percent for small firms to 23.1 percent for large firms.

In the four years following adoption, EPP firms perform well. The average four-year return for all EPP firms is 18.6 percent per year. This return is similar to both the CRSP value-weighted index (21.9 percent) and the comparison firms (23.4 percent). Although the differences are not statistically significant, adopters underperform the value-weighted benchmark by 330 basis points and the comparison firms by 480 basis points on a per year basis.

⁸ Since there is significant skewness in the stock returns, we repeat the analysis using medians, with largely similar results.

Panel B documents the average year-by-year returns for EPP firms and the CRSP value-weighted index for the period subsequent to adoption. Once again, the evidence indicates that EPP firms and the broad market have similar performance in each of the first four years following the adoption date. The EPP firms and the comparison firms also have similar performance in each of the four years following adoption.

Fama (1998) cautions that long-run return inferences are sensitive to the way long-run returns are measured. In particular, skewness and possible correlations of returns across events may significantly bias statistical results for long-run buy-and-hold returns. Fama suggests that alternative measures of long-run abnormal performance be estimated in order to ensure that return performance measurement is not sensitive to model specification.

To investigate the sensitivity of our results to these statistical problems, we follow Fama (1998) and measure stock performance of EPP firms using the average monthly returns procedure. For each calendar month, we calculate the abnormal return for each EPP firm as the difference between the return of the adopting firm and the return of a matched comparison firm. Equal- and value-weighted portfolio abnormal returns are formed each calendar month.

Following Jaffe (1974) and Mandelker (1974), we allow for changes in the risk of each abnormal return portfolio and heteroscedasticity of returns due to changes in portfolio composition. Specifically, we divide the abnormal portfolio return each month by an estimate of its standard deviation to produce a time series of monthly standardized portfolio abnormal returns. The overall abnormal return is then estimated by averaging the standardized monthly abnormal returns.

The results again show that EPP firms have performance similar to the comparison firms during the sample period. The overall standardized value-weighted portfolio abnormal return of 0.041 per month is not significantly different from zero ($t = 0.32$). Similarly, the standardized equal-weighted portfolio abnormal return of 0.017 per month is not significantly different from zero ($t = 0.13$).⁹

Overall, our long-run return results do not appear to be altered when consideration is given to the statistical problems noted by Fama (1998). These long-run return findings indicate that EPPs do not generate excess returns over either matched firms or a market index as a result of improved operating performance.

⁹ Our conclusions regarding the long-run stock price performance by EPP firms are robust across methods used to calculate excess returns. First, we calculate excess returns using size and market-to-book reference portfolios. Excess returns are computed for one-, two-, three-, and four-year rebalanced and buy-and-hold returns following the approach described in Barber, Lyon, and Tsai (1999). The mean monthly rebalanced excess return is 0.52%, 0.26%, 0.19%, and -0.68% for one-, two-, three-, and four-year holding periods, respectively. The corresponding t -statistics are 0.94, 0.59, 0.33, and -1.14. The mean monthly buy-and-hold excess return is 0.40%, -0.02%, -0.12%, and -1.32% for one-, two-, three-, and four-year holding periods, respectively. The corresponding t -statistics are 0.72, -0.04, -0.20, and -2.15. Next, we perform an intercept test based on the Fama and French (1993) three-factor model, and we find no evidence of significant excess performance. The overall abnormal return is 67 (-14) basis points per month with equally weighted (value-weighted) portfolio excess returns using ordinary least squares. Detailed results of these analyses are available from the authors upon request.

8. Conclusion

We have analyzed the long-run operating and stock price performance of firms adopting economic profit plans. In a sample of 51 firms that adopted EPPs between 1986 and 1994, we document significant improvements in operating performance in the years following adoption. While these results appear to support the hypothesis that EPPs motivate managers to make efficient investment decisions, a matched sample of nonadopters realizes similar changes in operating and stock performance during the same period.

We consider two competing explanations for why the EPP firms do not outperform the control firms. The first is based on the agency costs of managerial discretion. Simply stated, managers anticipate operating performance improvements due to mean reversion or industry-wide innovation, and seek to maximize compensation by increasing bonus payments. The second hypothesis is that managers change compensation structures after periods of poor performance in order to realign their incentives with those of shareholders. The first hypothesis suggests that anticipated improvements result in a change in incentives, whereas the second hypothesis suggests that the change in incentives results in improved performance.

The evidence is consistent with the incentive alignment hypothesis but not the opportunistic adoption hypothesis. The key finding is that bonus and equity compensation levels increase by a similar amount for the EPP and control firms. If managers were merely acting opportunistically to increase bonus levels, it is unlikely that they would elect a highly visible change like an EPP adoption when it is relatively easy to alter existing plans and avoid notice. Thus, our results are consistent with managers in both firms making changes to realign incentives, but electing different methods. This implies that, despite their recent popularity, EPPs are no better than traditional plans that combine earnings bonuses and equity participation.

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Appendix

Economic Profit Plan Adopters and Comparison Firms

Economic Profit Plan Adopters				Nonadopting Control Firms		
Year	Cusip	Company Name	Symbol	Cusip	Company Name	Symbol
1993	01741510	Allegheny Teledyne Inc/Teledyne	ALT	14428510	Carpenter Technology Corp	CRS
1993	02629V10	American Freightways Corp	AFWY	46119010	Intrenet, Inc.	INET
1994	02906910	American Precision Inds	APR	44307310	Howell Industries, Inc.	D.HCA
1993	03791710	Applied Bioscience Intl Inc	APBI	29356M10	Enron Corp	ENE
1993	03822510	Applied Power	APW	05978410	Banctec Inc	BTC
1994	04420410	Ashland Inc.	ASH	71644E10	Petro-Canada Inc.	PCZ
1992	05849810	Ball Corp	BLL	89621510	Trimas Corporation	TMS
1992	10530310	Brandon Systems Corp	BRA	75409P20	Rational Software Corp	RATL
1991	10904310	Briggs & Stratton	BGG	23768810	Data General Corp	DGN
1992	12709710	Cabot Oil & Gas Corp	COG	90921810	Unit Corporation	UNT
1992	17217210	Cincinnati Milacron Inc	MZ	64121710	Network Systems Corporation	NSCO
1994	19121610	Coca-Cola Co	KO	48783610	Kellogg Co.	K
1993	20476C10	Comptronix Corporation	3CPTX	86853210	Supertex Inc	SUPX
1991	22439910	Crane Co.	CR	13973020	Capital Associates, Inc.	CAII
1994	24419910	Deere & Co	DE	03783310	Apple Computer Inc.	AAPL
1987	25765110	Donaldson Co Inc	DCI	00190710	AST Research Inc	ASTA
1993	26633010	Duracell International, Inc.	DUR	86707110	Sunbeam Oster Co Inc	SOC
1994	27743210	Eastman Chemical Company	EMN	69350610	PPG Industries Inc.	PPG
1994	27746110	Eastman Kodak Co	EK	54385910	Loral Corp	LOR
1994	29442910	Equifax Inc	EFX	67000610	Novell Inc	NOVL
1994	36110610	Furon Co	FCY	14252210	Carlisle Plastics Inc	CPA
1986	37329810	Georgia-Pacific Group	GP	34746110	Fort Howard Paper Company	FORT
1994	38518910	Grancare Inc	GC.	30224T87	Humana Inc (Extencicare Inc)	EXEA
1993	41334510	Harnischegger Industries Inc	HPH	87537010	Tandem Computers Inc.	TDM
1994	42307410	HJ Heinz Co	HNZ	96647K10	Whitman Corp.	WH
1994	45337010	Incstar Corp	ISTR	36465710	Gamma Biologicals Inc	GBL
1994	46005H10	Intl Murex Tech Corp	MURXF	94268310	Watson Pharmaceuticals, Inc.	WATS
1994	47925410	Johnson Worldwide Associates	JWAIA	68250510	Oneida Ltd	OCQ
1994	48300710	Kaiser Aluminum Corp	KLU	57791310	Maxxam Inc.	MXM
1994	48300800	Kaiser Aluminum & Chemical CP	KLU1	04341310	American Smelting & Refining (ASARCO)	AR
1994	49460W10	Kinetic Concepts Inc	KNCI	17111710	Chromcraft Revington, Inc.	CRC
1994	50170810	L A Gear Inc	LAGR10	92193010	Vans, Inc.	VANS
1994	56357110	Manitowoc Co	MTW	87970010	Telxon Corp	TLXN
1994	57036310	Maritrans Inc	TUG	81190410	Seacor Holdings (Seacor Smit)	CKH
1994	57712810	Matthews International Corp	MATW	87156510	Synalloy Corp	SYNC
1994	58505510	Medtronic Inc	MDT	86366710	Stryker Corp	STRY
1994	59004910	Merix Corp	MERX	50069210	Koss Corp.	KOSS
1993	63562110	National Data Corp	NDC	68138510	Olsten Corp	OLS
1990	68417710	Orange Co	OJ	76857510	Riverbend International Corp	3rvrb
1994	71344810	Pepsico Inc	PEP	03522910	Anheuser Busch Cos. Inc.	BUD
1994	74045910	Premark International Inc	PMI	69642930	Pall Corp	PLL
1993	74190310	Primark Corp	PMK	15677T10	Ceridian Corp	CEN
1991	74740210	Quaker Oats Co	OAT	24236110	Dean Foods Co.	DF
1994	76133910	Revco D.S. Inc	RXR	54316210	Longs Drug Store Corp	LDG
1993	80652810	R P Scherer Corp	SHR	12960310	Calgon Carbon Corp	CCC
1993	80987710	Scott Paper Co.	SPP.1	90553010	Union Camp Corp	UCC
1994	87913110	Tektronix Inc	TEK	91270710	United States Surgical Corp	USS
1994	88034510	Tennant Co	TANT	50105210	Kronos Inc	KRON
1994	92224R60	Varity Corporation	VAT	38238810	Goodrich B F	GR
1992	92675410	Vigoro Corp	VGR	62853010	Mylan Laboratories	MYL
1993	94970210	Wellman Inc	WLM	60315810	Minerals Technologies Inc.	MTX

Table 1
Number of Economic Profit Plan Adoptions by Year and Industry

The industries listed in Panel B (defined by Compustat 2-digit SIC codes) are those in which at least two firms adopted an Economic Profit Plan (EPP) over the sample period. Regulated utilities (SIC = 481 and 491-494) and financial institutions and their holding companies (SIC = 600-699) are excluded.

Panel A: Number of EPP adopters by calendar year

Year	Number of Adopters	Percentage of Sample
1986	1	2.0
1987	1	2.0
1988	0	0
1989	0	0
1990	1	2.0
1991	3	5.9
1992	5	9.8
1993	12	23.5
1994	28	54.8
Total	51	100.0%

Panel B: Number of EPP adopters by industrial classification

Industry	SIC Code	Number of EPP Adopters
Industrial and Commercial Machinery and Computer Equipment	35	9
Food and Kindred Products	20	6
Chemicals and Pharmaceuticals	28	6
Primary Metal Industries	33	4
Communication and Electronic Equipment	36	3
Engineering & Scientific Instruments	38	3
Business Services	73	3
Paper and Allied Products	26	2
Rubber and Plastic Products	30	2
Fabricated Metal Products	34	2
Transportation Equipment	37	2
Engineering, Accounting, Research, Management, and Related Services	87	2
Other	-	7

Table 2**Summary statistics for cash compensation in dollars, equity-based compensation in common share equivalents, percentage of salary, bonus, options granted and stock compensation to total compensation, the age of CEO, and the voting power of officers.**

Mean values are reported for the EPP adopters and the control firms for the year prior to and the year of adoption.

	<u>Economic Profit Plan Adopters</u>		<u>Control Firms</u>	
	<u>Year Prior to Adoption</u>	<u>Year of Adoption</u>	<u>Year Prior to Adoption</u>	<u>Year of Adoption</u>
Panel A. Cash compensation (dollars)				
Salary	931,284	971,864	847,929	857,533
Bonus	374,693	521,281	398,464	547,364
Other compensation	187,107	221,614	89,650	92,275
Savings	7,616	8,279	8,941	7,518
Insurance	4,653	7,575	4,512	7,936
Total	1,505,354	1,730,612	1,349,495	1,512,626
Panel B. Equity-based compensation and current holdings (common share equivalents)				
Performance shares	43,550	2,259	0	0
Performance units	62,070	65,397	16,863	18,922
Restricted stock (shares)	19,588	1,850	21,520	19,950
Phantom stock (shares)	440	0	0	0
Dividend units	0	0	11	30
Options granted	95,479	130,109	90,054	124,860
Options held	419,749	461,131	347,942	405,621
Common shares held	317,391	593,807	1,735,523	1,613,990
Panel C: Percentage of compensation components to total compensation				
Salary(\$)/Total compensation	44.15%	47.67%	46.74%	47.43%
Bonus(\$)/Total compensation	17.07%	16.63%	19.70%	18.56%
Options granted(\$)/Total compensation	20.94%	22.55%	23.70%	26.30%
Stock compensation (\$)/Total compensation	12.38%	8.87%	6.79%	5.04%
Panel D. Age of CEO and voting power of officers				
CEO Age	54.3	54.2	55.7	55.6
Options granted/Total shares outstanding	1.21%	0.63%	1.11%	0.69%
Options held/Total shares outstanding	3.67%	2.08%	3.57%	2.07%
Common shares held/Total shares outstanding	3.19%	2.15%	8.12%	8.36%

Table 3
Summary statistics for outside blockholders and board composition

Outside blockholders are defined as beneficial owners who hold more than 5 percent of the outstanding common shares. Board composition variables include the size of the board, the percentage of outside directors, and the percentage of directors employed by manufacturing firms, bank-like institutions, investment banks, venture capital institutions, and insurance companies. Mean values are reported for the EPP adopters and the comparison firms for the year prior to and the year of adoption.

	Economic Profit Plan Adopters		Control Firms	
	Year Prior to Adoption	Year of Adoption	Year Prior to Adoption	Year of Adoption
Panel A: Outside blockholdings				
Number of outside blockholders	1.88	1.92	1.45	1.78
Percentage of shares held by outside blockholders	23.73%	25.73%	18.10%	18.70%
Panel B: Composition of board				
Number of board members	9.4	9.6	8.6	8.6
Percentage of independent directors	71.61%	71.69%	62.26%	65.44%
Percentage of independent directors employed by manufacturing firms	38.62%	37.85%	20.18%	22.54%
Percentage of independent directors employed by bank-like institutions	2.91%	2.80%	1.79%	1.69%
Percentage of independent directors employed by investment banking firms	4.77%	3.61%	1.68%	2.41%
Percentage of independent directors employed by venture capital institutions	4.90%	4.33%	6.68%	6.18%
Percentage of independent directors employed by insurance companies	1.28%	1.40%	0.75%	0.93%

Table 4
Median OIBD/Assets, Profit Margin, ROA, OIBD/Sales, Capital Expenditures and R&D/Assets, and Market-to-book Ratios for EPP Adopters and Comparison Firms

Panel A reports median ratios for the 51 firms adopting economic profit plans (EPPs) during 1986-1994. The Compustat data items for the variables are operating income before depreciation/assets [OIBD + interest income (items #13 + #62)/assets (item #6)]; profit margin [net income including extraordinary items (item #172)/sales (item #12)]; return on assets [net income (item #172)/assets (item #6)]; OIBD/sales [OIBD + interest income (items #13 + #62)/sales (item #12)]; CE + RD/assets [capital expenditures (item #128) + research and development expense (item #46)/assets (item #6)]; market value/book value [shares (item #54) times price (item #199)/book value of equity (item #60)]. Panel B reports median ratios for comparison firms. Comparison firms are chosen by matching each adopting firm with a firm that has not previously adopted an EPP using the algorithm: 1) If there is at least one nonadopter in the same two-digit industry with end-of-year 0 assets within 25% to 200% of the adopting firm, the nonadopter with the closest OIBD/assets is used; 2) if no nonadopter meets this criterion, then all nonadopters with year 0 assets of 90% to 110% of the adopter are ranked, and the firm with the closest, but higher, OIBD/assets is used. If a nonadopter is delisted from Compustat while the adopter is still trading, a replacement nonadopting firm is spliced in on a point-forward basis. Panel C reports z-statistics testing the yearly equality of distributions between the EPP adopters and the comparison firm nonadopters. The significance tests are based on the Wilcoxon signed rank test.

Panel A: Adopter Median Values

Fiscal Year Relative to Adoption	OIBD/ Assets	Profit Margin	ROA	OIBD/ Sales	CE + RD/ Assets	Market/ Book	Number of Firms
-4	17.53%	5.52%	6.33%	13.46%	7.27%	1.93	47
-3	15.99%	3.82%	5.03%	13.58%	7.00%	1.73	49
-2	16.97%	3.55%	3.84%	12.45%	7.78%	1.84	50
-1	15.77%	3.14%	3.54%	11.91%	6.66%	2.10	51
0	16.09%	4.10%	4.69%	13.02%	7.18%	2.38	51
1	17.71%	4.90%	6.27%	13.64%	7.52%	2.40	51
2	16.94%	5.12%	6.37%	12.81%	7.41%	2.62	50
3	15.81%	4.90%	5.71%	13.36%	7.35%	2.85	42
4	16.69%	5.90%	5.67%	14.37%	7.97%	2.85	28

Panel B: Nonadopter Median Values

Fiscal Year Relative to Adoption	OIBD/ Assets	Profit Margin	ROA	OIBD/ Sales	CE + RD/ Assets	Market/ Book	Number of Firms
-4	17.05%	6.24%	6.71%	17.23%	9.34%	2.44	47
-3	17.02%	6.00%	7.00%	16.93%	9.58%	1.72	49
-2	15.13%	5.08%	5.64%	14.77%	9.96%	1.78	50
-1	16.02%	4.83%	5.09%	15.20%	8.58%	2.28	51
0	16.38%	5.49%	6.03%	15.73%	7.85%	2.49	51
1	16.60%	5.88%	6.20%	15.86%	8.97%	2.42	51
2	16.25%	6.26%	5.97%	16.33%	9.80%	2.12	50
3	16.54%	6.61%	7.57%	17.44%	9.01%	2.30	42
4	17.45%	6.98%	7.25%	17.61%	8.72%	2.19	28

Table 4 (Continued)
Median OIBD/Assets, Profit Margin, ROA, OIBD/Sales, Capital Expenditures and R&D/Assets, and Market-to-book Ratios for EPP Adopters and Comparison Firms

Panel A reports median ratios for the 51 firms adopting economic profit plans (EPPs) during 1986-1994. The Compustat data items for the variables are operating income before depreciation/assets [OIBD + interest income (items #13 + #62)/assets (item #6)]; profit margin [net income including extraordinary items (item #172)/sales (item #12)]; return on assets [net income (item #172)/assets (item #6)]; OIBD/sales [OIBD + interest income (items #13 + #62)/sales (item #12)]; CE + RD/assets [capital expenditures (item #128) + research and development expense (item #46)/assets (item #6)]; market value/book value [shares (item #54) times price (item #199)/book value of equity (item #60)]. Panel B reports median ratios for comparison firms. Comparison firms are chosen by matching each adopting firm with a firm that has not previously adopted an EPP using the algorithm: i) If there is at least one nonadopter in the same two-digit industry with end-of-year 0 assets within 25% to 200% of the EPP firm, the nonadopter with the closest OIBD/assets is used; ii) if no nonadopter meets this criterion, then all nonadopters with year 0 assets of 90% to 110% of the adopter are ranked, and the firm with the closest, but higher, OIBD/assets is used. If a nonadopter is delisted from Compustat while the adopter is still trading, a replacement nonadopting firm is spliced in on a point-forward basis. Panel C reports z-statistics testing the yearly equality of distributions between the EPP adopters and the industry-matched nonadopters. The significance tests are based on the Wilcoxon signed rank test.

Panel C: Z-Statistics Testing the Yearly Equality of Distributions Between EPP Adopters and Matching Nonadopters Using the Wilcoxon Matched-Pairs Signed-Ranks Test

Fiscal Year Relative to Adoption	OIBD/ Assets	Profit Margin	ROA	OIBD/ Sales	CE + RD/ Assets	Market/ Book	Number of Firms
-4	0.09	0.26	0.02	0.85	0.53	0.56	47
-3	0.47	2.54	1.95	1.69	1.81	-0.47	49
-2	0.16	0.81	0.90	1.46	1.40	-0.81	51
-1	0.18	1.95	1.49	1.29	1.51	-0.09	51
0	-0.22	-1.05	-0.78	-1.73	1.12	0.16	51
1	-0.36	1.21	0.76	1.40	1.32	-0.49	51
2	-0.66	1.01	0.36	1.10	1.39	-0.93	51
3	-0.32	0.91	0.02	1.15	0.91	-0.72	42
4	0.16	0.10	-0.21	0.56	0.05	-0.89	28

Table 5
Z-Statistics Testing the Equality of Distributions in the Ratios between Years for Median OIBD/Assets, Profit Margin, ROA, OIBD/Sales, Capital Expenditures and R&D/Assets, and Market-to-Book Ratios for EPP Adopters and Comparison Firms.

Z-statistics test the equality of distributions in the performance ratios between years for the 51 firms adopting economic profit plans (EPPs). The Compustat data items for the variables are operating income before depreciation/assets [OIBD + interest income (items #13 + #62)/assets (item #6)]; profit margin [net income including extraordinary items (item #172)/sales (item #12)]; return on assets [net income (item #172)/assets (item #6)]; OIBD/sales [OIBD + interest income (items #13 + #62)/sales (item #12)]; CE + RD/assets [capital expenditures (item #128) + research and development expense (item #46)/assets (item #6)]; market value/book value [shares (item #54) times price (item #199)/book value of equity (item #60)]. The significance tests are based on the Wilcoxon signed rank test.

Panel A. Cash Flow Related Measures of Operating Performance						
Fiscal Year Relative to Adoption	Fiscal Year Relative to the Adoption					
	0	1	2	3	4	
OIBD/Assets						
-4	0.62	0.91	1.97	1.72	0.79	
-3	-0.25	0.34	1.43	1.73	0.31	
-2	1.10	2.16	2.17	2.66	1.39	
-1	1.27	1.18	2.78	1.93	1.32	
0		1.02	1.74	1.42	1.12	
Profit Margin						
-4	-1.42	-0.93	0.02	-0.25	0.92	
-3	0.09	0.64	1.47	1.26	2.53	
-2	1.01	2.33	2.49	2.86	3.44	
-1	2.72	3.42	3.67	2.67	4.20	
0		1.35	2.31	1.07	3.17	
ROA						
-4	-1.44	-0.46	0.98	0.12	0.52	
-3	-0.13	0.39	1.66	1.29	1.64	
-2	1.02	2.20	2.52	2.96	2.48	
-1	2.33	2.63	3.63	2.67	3.36	
0		1.17	2.44	0.79	2.54	
OIBD/Sales						
-4	-1.33	-0.69	-0.17	0.91	0.67	
-3	-0.80	-0.14	0.51	1.65	1.71	
-2	0.88	2.08	1.57	2.82	2.39	
-1	1.41	1.82	1.87	1.98	2.22	
0		1.97	1.72	1.76	2.09	

Table 5 (Continued)

Z-Statistics Testing the Equality of Distributions in the Ratios between Years for Median OIBD/Assets, Profit Margin, ROA, OIBD/Sales, Capital Expenditures and R&D/Assets, and Market-to-Book Ratios for EPP Adopters and Comparison Firms

Z-statistics test the equality of distributions in the performance ratios between years for the 51 firms adopting economic profit plans (EPPs). The Compustat data items for the variables are operating income before depreciation/assets [OIBD + interest income (items #13 + #62)/assets (item #6)]; profit margin [net income including extraordinary items (item #172)/sales (item #12)]; return on assets [net income (item #172)/assets (item #6)]; OIBD/sales [OIBD + interest income (items #13 + #62)/sales (item #12)]; CE + RD/assets [capital expenditures (item #128) + research and development expense (item #46)/assets (item #6)]; market value/book value [shares (item #54) times price (item #199)/book value of equity (item #60)]. The significance tests are based on the Wilcoxon signed rank test.

Panel B. Investment-Related Measures of Operating Performance						
Fiscal Year Relative to Adoption	Fiscal Year Relative to the Adoption					
	0	1	2	3	4	
(CE + RD)/Assets						
-4	-1.22	-0.52	-0.29	0.25	1.19	
-3	-0.55	0.40	0.65	0.81	0.42	
-2	-1.33	-0.36	-0.18	-0.36	-0.93	
-1	-0.22	1.47	1.21	1.03	0.96	
0		1.87	1.59	1.32	0.62	
Market/Book						
-4	2.07	2.48	3.24	3.65	2.52	
-3	2.08	2.84	3.02	4.32	2.83	
-2	1.61	3.19	2.93	4.25	2.74	
-1	1.15	2.55	2.61	3.17	2.33	
0		2.28	2.41	2.43	1.32	

Table 6
Two-stage least squares estimates of operating performance characteristics

The endogenous variables are the two-year changes in market-to-book ratio, (operating income before depreciation)/sales, and (capital expenditures + research and development expenses)/sales.

	Dependent variable					
	Change in market-book ratio		Change in (operating income before depreciation)/sales		Change in (capital expenditures and R&D)/total assets	
	(1)		(2)		(3)	
	Parameter estimate	t-statistic	Parameter estimate	t-statistic	Parameter estimate	t-statistic
Endogenous variables						
Change in market-to-book ratio	n.a.	n.a.	-0.003	-0.40	0.006	2.07 **
Change in (operating income before depreciation)/sales	-0.568	-0.16	n.a.	n.a.	-0.107	-1.60
Change in (capital expenditures and R&D)/total assets	24.740	3.09 ***	-0.778	-2.14 **	n.a.	n.a.
Exogenous variables						
Intercept	-1.343	-0.76	-0.209	-2.99 ***	0.017	0.46
EPP Adopter dummy	0.201	0.18	0.047	0.96	-0.119	-5.62 ***
% equity-based compensation for top executives	2.655	1.59	0.035	0.49	0.112	3.30 ***
% equity-based compensation for top executives interacted with EPP adopters	0.538	0.24	0.185	1.94 *	-0.161	-3.59 ***
% bonus-based compensation for top executives	4.202	2.05 **	0.212	2.65 **	0.158	3.93 ***
% bonus-based compensation for top executives interacted with EPP adopters	-2.079	-0.66	0.104	0.76	-0.218	-3.44 ***
% shares and stock outstanding held by top executives	-0.274	-0.24	0.181	4.55 ***	0.051	2.31 **
% shares and stock outstanding held by top executives interacted with EPP adopters	-1.889	-0.44	-0.200	-1.10	-0.255	-3.09 ***
% shares held by all outside blockholders	0.678	0.60	-0.111	-2.45 **	-0.033	-1.48
% of outside directors	0.083	0.07	0.028	0.54	-0.058	-2.53 **
Long-term debt/total assets (Cash+marketable securities)/total assets	2.977	1.67 *	0.255	3.73 ***	0.023	0.61
	-5.361	-3.43 ***	0.054	0.77	-0.042	-1.26
Standard deviation of operating income to total assets	0.598	0.13	0.506	2.91 ***	0.204	2.35 **
Log of total assets	-0.795	-3.88 ***	-0.018	-1.87 *	0.004	0.92
CEO age	0.074	2.70 ***	0.002	1.96 *	0.001	0.92
Adjusted R-square	0.3407		0.7031		0.5622	
F-statistics	3.552		12.69		7.34	

Note: One, two and three asterisk(s) in superior indicates 'significantly different' from zero at the 10%, 5%, and 1% level, respectively.

Table 7
Mean Annual Returns of EPP Adopters, their Matching Firms,
and the Market, during the Four Years after Adopting

In Panel A, the mean annual returns are calculated for the 43 companies adopting economic performance plans in 1986-1994 meeting the criteria used in this paper. Matching (nonadopter) firms are chosen on the basis of industry, size, and OIBD/assets using the algorithm described in Table 2. One-year and four-year return periods are measured from the issue date, rather than using fiscal years. The mean CRSP value-weighted NYSE-AMEX-Nasdaq market return during the prior year is 14.2%. Index returns are calculated by compounding the daily CRSP value-weighted NYSE-AMEX-Nasdaq index over the same trading days. In Panel A, the number of firm years is calculated by summing, over the number of firms in a portfolio, the number of post-EPP adoption event-years for which the firm (matched firm) is listed on the CRSP tapes for at least part of a year. For the majority of firms, this is four years. For a firm that is delisted early it may be less than four years. Firms in the smallest half have post-issue assets of \$22.3 to \$562.2 million; and those in the largest half have assets of \$605.9 million to \$24.8 billion. Asset values at the end of the fiscal year of issuing are expressed in terms of 1994 purchasing power. In Panels B and C, mean annual returns are computed for the four post-EPP adoption event years. Each year, the mean is computed only for those issuers that are still CRSP-listed during the year. If a firm is delisted during the year, the CRSP value-weighted index of NYSE-AMEX-Nasdaq stocks is spliced in for the remainder of the year. Sample sizes in Panels B and C range from 48 in year 1 to 35 in year 4. T-statistics are calculated assuming normality and independence.

Panel A: Mean annual returns during the pre- and post-issue periods

Asset Portfolio	Number of Firms	Mean Prior Annual Return on Adopters	Mean Post-Adoption Annual Returns			
			Adopting Firms	VW Index	Matching Firms	Number of Firm-Years
Smallest	22	13.2%	17.9%	22.0%	24.8%	79
Largest	21	23.1%	19.2%	21.8%	22.0%	90
Total	43	17.5%	18.6%	21.9%	23.4%	169

Panel B: Mean annual returns by event-year for issuers and the CRSP value-weighted index

Portfolio	Post-EPP Adoption Event Year			
	Year 1	Year 2	Year 3	Year 4
EPP Adopters	26.4%	22.7%	22.2%	12.2%
VW-Index	18.3%	23.2%	24.5%	21.2%
Market-adjusted t-statistic	8.2%	-0.5%	-2.4%	3.9%
	1.33	-0.09	-0.45	-1.39

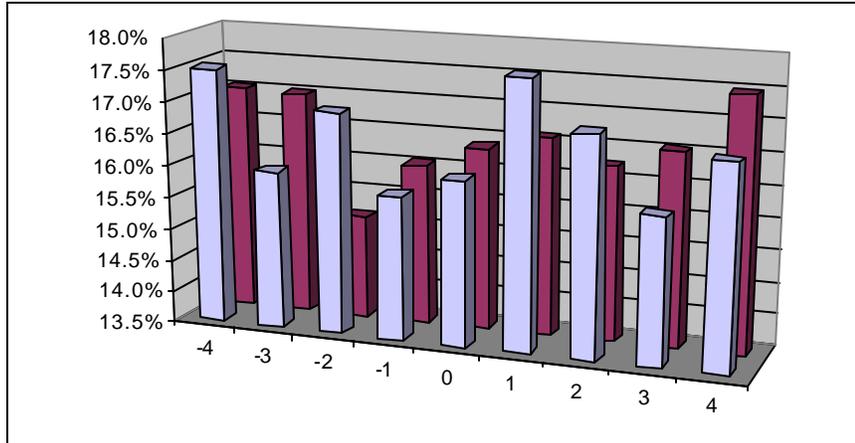
Table 7 (continued)
Mean Annual Returns of EPP Adopters, their Matching Firms,
and the Market, during the Four Years after Adopting

In Panel A, the mean annual returns are calculated for the 43 companies adopting economic performance plans in 1986-1994 meeting the criteria used in this paper. Matching (nonadopter) firms are chosen on the basis of industry, size, and OIBD/assets using the algorithm described in Table 2. One-year and four-year return periods are measured from the issue date, rather than using fiscal years. The mean CRSP value-weighted NYSE-AMEX-Nasdaq market return during the prior year is 14.2%. Index returns are calculated by compounding the daily CRSP value-weighted NYSE-AMEX-Nasdaq index over the same trading days. In Panel A, the number of firm years is calculated by summing, over the number of firms in a portfolio, the number of post-EPP adoption event-years for which the firm (matched firm) is listed on the CRSP tapes for at least part of a year. For the majority of firms, this is four years. For a firm that is delisted early it may be less than four years. Firms in the smallest half have post-issue assets of \$22.3 to \$562.2 million; and those in the largest half have assets of \$605.9 million to \$24.8 billion. Asset values at the end of the fiscal year of issuing are expressed in terms of 1994 purchasing power. In Panels B and C, mean annual returns are computed for the four post-EPP adoption event years. Each year, the mean is computed only for those issuers that are still CRSP-listed during the year. If a firm is delisted during the year, the CRSP value-weighted index of NYSE-AMEX-Nasdaq stocks is spliced in for the remainder of the year. Sample sizes in Panels B and C range from 48 in year 1 to 35 in year 4. T-statistics are calculated assuming normality and independence.

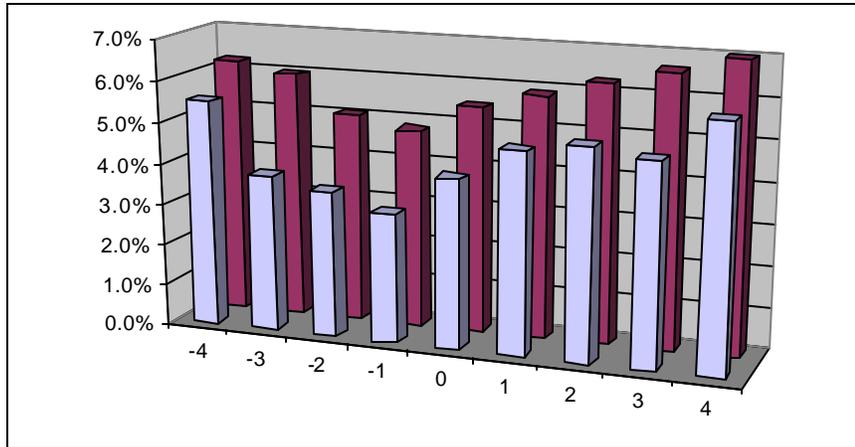
Panel C: Mean annual returns by event-year for issuers and matching firms
Post-EPP Adoption Event Year

Portfolio	Year 1	Year 2	Year 3	Year 4
EPP Adopters	26.4%	22.7%	22.2%	12.2%
Matching firms	26.8%	10.9%	17.0%	41.4%
Matching-firm adjusted	-0.39%	11.8%	5.2%	-29.2%
t-statistic	-0.04	1.55	0.73	-2.49

OIBD/Assets, %



Profit Margin, %



Market-to-Book

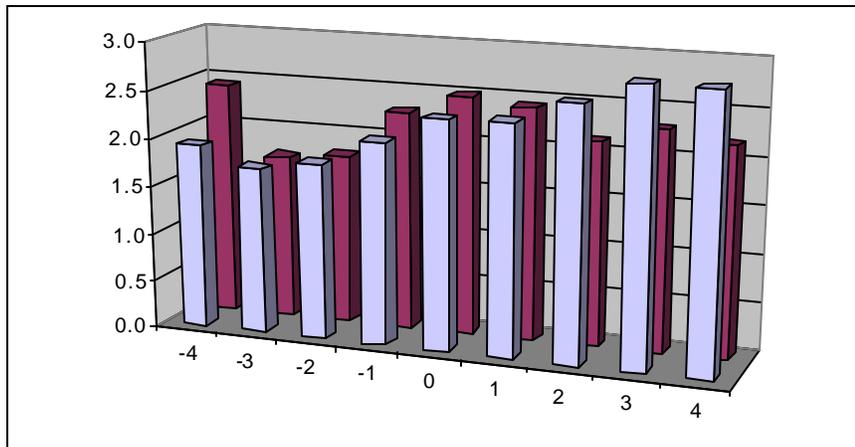


Figure 1. Operating income before depreciation, amortization, and taxes, plus interest income (OIBD)/assets (top), profit margin (middle), and market-to-book (bottom) for the median adopter and nonadopter. The numbers plotted are reported in Table 4 for the nine fiscal years centered on the fiscal year of the EPP adoption. The rectangles in front and back respectively are the EPP adopters and the matched firms.