Political Costs and Accounting Method Choice: The Pharmaceutical Industry

MICHAEL J. MEYER
Department of Accounting
College of Business
Southeastern Louisiana University
Hammond, LA 70402

KHONDKAR E. KARIM

STEPHEN C. GARA
School of Professional Accountancy
College of Management
Long Island University - C.W. Post Campus
Brookville, NY

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Abstract

This study examines the validity of positive accounting research by calculating the net income effect of accounting and managerial choices within the pharmaceutical industry. The overall results support the positive accounting theory. The accounting choices of larger firms showed a net negative income effect. In contrast, the accounting choices of smaller firms had a less net negative or even a net positive effect. The political variables specific to the industry, with the exception of two, were all significant in the hypothesized direc-

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tion. When the three significant political variables were linearly combined using factor analysis, the resulting political factor was highly significant in explaining the effect of accounting and managerial choices.

Introduction

Since Watts and Zimmerman's (1978) pioneering work on positive accounting, the research stream in this subject has been characterized by incremental improvements in the research design. Positive Accounting theory attempts to understand why accounting policies matter and to predict which particular accounting policies firms will choose. The theory is based on a view of the firm as a "nexus of contracts." That is, a business entity can be described by the various contracts it enters into, and if we want to understand why managers prefer certain accounting policies and oppose others, we should look at the firm's contracts (Scott, 1997).

Zmijewski and Hagerman (ZH) (1981) performed one of the most significant contributions to this research in which they hypothesized that the accounting choices made by firms were part of a larger strategy rather than individual choices made in a vacuum. Before ZH (1981) most of the research in the area of accounting choice concentrated on explaining only one accounting choice.

Watts and Zimmerman (1990) reviewed the primary criticisms levied against their theory by dividing the criticisms into two categories, research method issues, and methodological (philosophical) issues. This research is particularly interested in addressing two research method issues: the left-side (dependent) and right-side (independent) variables.

With respect to the dependent variable, this research seeks to determine the effect of the set of accounting choices on net income. Since accounting strategies (set of accounting choices) are not made within a vacuum, some measurement of managerial strategies was also necessary. Concentrating on one industry - the pharmaceutical industry, can facilitate the measurement of the net income effect. The effect of a set of accounting and managerial choices can be determined by calculating the effect of the choice against an industry norm.

Industry based items were used to measure independent variables. While focusing on one industry limits the external validity of the research, it should provide significantly more power by controlling for industry-related confounding variables.

The remainder of the paper is organized as follows. The next section of the paper discusses a linkage between management and accounting strategy. Section III describes the steps performed in calculating the effects on net income from accounting and managerial choices. Section IV describes the current pharmaceutical environment. A brief discussion of *Positive Accounting Theory* follows in Section V. Section VI discusses each of the political cost variables chosen. Section VI discusses the other variables used in the analysis. Section VII describes the model as well as the results of the regression analysis. The concluding remarks are contained in Section VIII.

Linkage Between Management Strategy and Accounting Strategy

Accounting standards allow for a considerable amount of discretion in their application. According to the Statement of Financial Accounting Concept (SFAC) No. 2: *Qualitative Characteristics of Accounting Information* such discretion is necessary to insure the relevance and reliability of the information being provided. Thus, managers possess the discretion to choose from a given set of acceptable accounting conventions. It is likely, therefore, that the selected accounting choices reflect managerial strategies. The choices made in applying accounting conventions are endogenous to the total firm management strategy. A model of accounting choice is postulated grounded on the theory that managers are rational and are guided by the principles of firm value maximization and avoidance of re-contracting costs (Malmquist 1990). This is contrary to the notion that for a given transaction, there is one, and only one, appropriate accounting convention. Recently, auditors have been criticized for not evaluating the appropriateness of these accounting choices. The accusation is that auditors simply determine the acceptability of the choices made (Schuetze, 1993).[1]

Management strategy relates to internal managerial decisions such as, product line decisions, capital acquisitions and disposals, and employee benefits. These decisions comprise the overall firm or management strategy and are framed within the context of the environment in which the firm belongs. Generally, changes or anticipated changes in the environment should result in changes in strategy. If one believes that accounting choices are part of the overall management strategy, environmental changes (or anticipated changes) should cause changes in accounting choices as well. Within one industry, at any given point in time, the environmental forces exerted on all firms within the industry should be fairly constant. Thus, differences from an industry benchmark or average for a given application of an accounting convention are part of the overall management strategy. Hall and Stammerjohan (1997) examined the relationship between the incidence of the litigation events with potentially large damage awards and managers' accounting choices. Their results indicated that managers of oil firms facing potentially large damage awards choose income decreasing non-working capital accruals relative to managers of other firms. Additionally, the results indicate that the management of these firms makes accounting choices that result in lower non-working accruals during the litigation period than in other years.

The notion that there is anarchy in applying accounting principles should not be assumed, although some discretion is provided to managers. Generally Accepted Accounting Principles are a score keeping mechanism comprised of complex rules. In this sense, whether to apply the rules for a given transaction is a decision exogenous to the management strategy (i.e., up to the Securities and Exchange Commission and Financial Accounting Standards Board). Management may, however, decide not to engage in such transactions. In many cases, once the transaction has taken place, the rules governing the accounting are quite explicit (e.g., Statement of Financial Accounting Stan-

dards (SFAS) No. 2: *Accounting for Research and Development Costs).* In other cases, however, the rules can be complex and seemingly explicit, but their application allows management the opportunity to manipulate its income statement and balance sheet. For example, when a firm has a defined benefit pension plan for its employees, the rules governing the accounting for such a decision are generally non-discretionary. However, the assumptions that are necessary to apply the standard (SFAS No. 87) are left for management's discretion (i.e., discount rate used to calculate the projected benefit obligation, long-term annual compensation rate increases). In addition, the decision to have a defined benefit plan is itself part of an overall management strategy.

The seminal research in accounting strategies by ZH (1981) treated the firm's set of accounting choices as a single comprehensive decision. While they did not explicitly link the accounting choices to a larger management strategy, they implicitly suggested this when they stated, "management will adopt a multi-dimensional income strategy for the firm with each policy being one dimension of that decision," ZH (1981, 133). The authors examined four separate accounting policies (depreciation, inventory, pension costs, and investment tax credit) and classified each policy as either income increasing or income-decreasing. Five, seven and nine different strategies were defined based upon the weights given to individual policies and to combinations of income-increasing and income-decreasing strategies. Their rationale for using such a rating scheme was their suggestion that they were not able to measure the exact effects of the various accounting principles.

This paper quantifies the effects of significant accounting and managerial strategies for firms within the pharmaceutical industry. Following the industry baseline approach used by Christie and Zimmerman (1994), this study concentrates in one industry in order to minimize the noise associated with multi-industry studies. The present study differs from the ZH (1981) study in how accounting choices/policies are defined. For example, the authors considered the selection of depreciation choice as either straight-line method or accelerated methods. The current study (for power reasons as well as out of necessity since all firms in the sample used straight-line depreciation) calculated the estimated useful lives among classes of assets. Since determining the useful life is a managerial decision, any deviation of estimated useful lives from an industry average estimated useful life for each class of asset would be an indication of a managerial/accounting strategy. The income effect would equal the difference between depreciation expense using the actual useful lives versus depreciation expense based upon the industry average estimated useful lives.

The Effects of Accounting and Managerial Choices

This section describes the calculations for determining the income statement effects of the accounting and managerial choices made regarding depreciation, inventory write-offs, bad debt expenses, defined benefit pension expenses, other post retirement benefits expenses, and other discretionary accruals. This section also describes the assumptions and data sources.

The sample consisted of thirty-five large, based on net revenue, publicly traded pharmaceutical firms selected from *Ward's Business Directory of U.S. Private and Public Companies - 1993.* Of these thirty-five firms only twenty-eight responded to the questionnaires. One firm was eliminated from the sample since it only manufactured packaging for pharmaceuticals. An additional five companies were eliminated from the sample due to insufficient information (i.e., no 10-K). Two firms were also eliminated due to substantial write-downs of inventory and accounts receivable due to non-compliance with the U.S. Food and Drug Administration's Good Manufacturing Practices regulations. These two firms were generic drug manufacturers and were outliers in the sample. The final sample contains twenty firms. The sample median values were used as the industry averages.

The following details reveal how each variable in this study was defined and calculated and also provide the source of data.

Depreciation: The effect on net income due to depreciation was calculated based upon the following set of formulas:

$$AFA_{kit} = (FA_{kit} + FA_{kit-1}) / 2.$$
$$UL_{ki} = AFA_{kit} / DE_{kit}$$
$$DE_{km} = AFA_{kit} / UL_{km}$$
$$NIEUL_{i} = (\Sigma DE_{km})-(\Sigma DE_{ki})$$

Where:

FA_{kit} =	fixed asset k for firm i at time t and t-1.
AFA_{kit} =	average fixed asset k for firm i.
DE_{ki} =	depreciation expense for fixed asset k for firm i.
UL_{ki} =	estimated useful life for fixed asset k for firm i.
UL_{km} =	industry median UL_{k}.
DE_{km} =	industry median DE_{k}.
t =	1993.
$NIEUL_{i}$ =	net income effect for firm *i* for depreciation at time *t*, based on *k* fixed assets.

The primary source of information was the sample firms' 10-K filings, Supplementary Schedules V and VI. These supplementary schedules give a breakdown of fixed assets by category (to be consistent across the sample, the depreciable assets were categorized as either building or equipment) and accumulated depreciation by fixed asset category. A positive $NIEUL_{kmt}$ would indicate a smaller depreciation than expected using the industry median estimated useful life, e.g., an income-increasing choice.

Inventory Write-down: In the ZH study, the basis for determining the inventory policy choice as income increasing or income-decreasing was based upon the LIFO/FIFO dichotomy. However, in the pharmaceutical industry, the inventory turnover is sufficiently high to make the effect of either inventory costing method negligible.[2] The real management discretion revolves around write-downs of inventory (NLINV). It was assumed that the industry average was zero. As such, when there was a write-down of inventories, it was considered an income decreasing strategy. The source of the infor-

mation was Supplementary Schedule VIII of Form 10-K which discloses changes in the valuation allowance accounts, including accounts receivable and inventory, if applicable.

Bad Debt Expense: the effect on net income due to bad debt expense was calculated based upon the following set of formulas:

$$AVGAR_{it} = (AR_{it} + AR_{it-1}) / 2$$
$$BDPER_i = BD_i / AVGAR_{it}$$
$$BD_m = BDPER_m * ARAVG_{it}$$
$$NIBD_i = BD_m - BD_i$$

Where:

AR_{it} = accounts receivable balance for firm i at time t and t-1.
t = 1993.
BD_i = bad debt expense for firm i.
$BDPER_i$ = bad debt as a percentage of average accounts receivable for firm i.
$BDPER_m$ = industry median BDPER.
$NIBD_i$ = net income effect for firm i due to bad debt expense.

The source of the bad debt information was the same as described for Inventory write-offs, at time *t* Supplementary Schedule VIII to the Form 10-K. The accounts receivable balances were available from the balance sheet in the annual report as well as in the Supplementary Schedule VIII of form 10-K.

Post-Retirement Benefits: A significant firm expense category consists of post-retirement benefits, particularly for defined benefit plans. Managerial discretion evidences itself in this area through the decision to operate a defined benefit plan and incur the corresponding pension expense. The ratio of pension expense (DB) to sales captures the size-relative net income effect of utilizing or not utilizing a defined benefit plan.

$$DBPER_i = DB_{it} / SALES_i$$
$$NINDB_i = DBPER_m * SALES_i * PLAN_i$$

Where:

DB_i = defined benefit plan expense for firm i.
$SALES_i$ = net sales for firm i.
$DBPER_i$ = defined benefit plan expense as a percentage of net sales for firm i, calculated for firms with plans only.
$DBPER_m$ = industry median $DBPER_{it}$
$PLAN_i$ = dummy variable where 1 = company with out a defined ben efit plan, 0 otherwise.
$NINDB_i$ = net income effect due to not having a defined benefit plan.

For those firms with a defined benefit plan, managerial discretion would manifest itself through the set of assumptions underlying the actuarial present value calculations (discount rate, etc.). Since there are an infinite number of possible combinations of actuarial assumptions, it was decided to simply determine whether the plan expense for a given firm as a percentage of sales was greater than or less than the sample median percentage. The

calculation of this net income effect was determined using the following formulas:

$$DB_{imt} = DBER_{mt} * SALES_{it}$$

$$NIDB_{it} = DB_{imt} - DB_{it}$$

Where:

DB_{imt} = defined benefit plan expense for firm i, based on industry median.

$NIDB_i$ = net income effect due to management determined actuarial assumptions.

The data necessary for calculating these variables was available from the footnotes of the 1993 financial statements provided in the annual report.

Other Post-Retirement Benefits: In most cases, the primary element of these expenses consisted of health care benefits provided to retired employees. The assumptions used in calculating the net income effect were the same as those discussed in conjunction with the defined benefit plans. The formulas for determining the net income effects for firms who offer and those that do not offer post-retirement benefits are also quite similar to those defined for defined benefit plans. They are as follows:

$$PRBPER_i = PRB_i / SALES_i$$

$$NIPRB_i = PRBPER_m * SALES_i * BENEFIT_i$$

Where:

PRB_i = other post-retirement benefit expense for firm i.

$SALES_i$ = net sales for firm i.

$PRBPER_i$ = other post-retirement benefit expense as a percentage of net sales for firm i; calculated for firms with plans only.

$PRBPER_m$ = industry median PRBPER.

$BENEFIT_i$ = dummy variable for firm i, where 1 = company with out other post-retirement benefits, 0 otherwise.

$NIPRB_i$ = net income effect for firm i due to not having other post-retirement benefits.

For those firms providing other post-retirement benefits, managerial discretion manifests itself through the selection of various assumptions underlying the actuarial present value calculations (discount rate, etc.). Since there are an infinite number of possible combinations of actuarial assumptions, it was decided to simply determine whether the benefits expense for a given firm as a percentage of sales was greater than or less than the sample median percentage. The calculation of the net income effect was determined using the following formulas:

$$PRB_{im} = PRBPER_m * SALES_i$$

$$NIPRBA_i = PRB_{im} - PRB_i$$

Where:

PRB_{im} = other post-retirement benefit expense for firm i, based upon industry median.

$NIPRBA_i$ = net income effect for firm i due to management determined actuarial assumptions.

The data necessary for calculating these variables was available from the footnotes of the 1993 financial statements provided in the annual report.[3]

Other Significant Non-Cash Accruals: Due to industry environmental factors, many firms within the pharmaceutical industry were in process of restructuring their businesses. As such, much of the other significant accruals related to non-cash restructuring accruals. Litigation accruals were the second most prevalent "other accrual." These items appeared on the Cash Flows statement as non-cash items were added back to net income in determining net cash flows from operations. It was assumed that the industry average for these other significant accruals was zero. Thus, if there were an accrual, the net effect on net income would have been in the direction of the accrual (there was one positive value, which related to a reduction of a prior year's accrual due to a settlement of a litigation claim).

Discussion and Results: Once each of the net income effects was calculated as described above, all the net income effects were summed. For regression assumption reasons, the resulting variable had to be transformed to create a normally distributed variable (the fourth root was taken of the dollar values). The net income effects were expected to be negative for the firms with relatively higher political pressures, based on Positive Accounting Theory (Watts & Zimmerman, 1978; Holthausen & Leftwich, 1983; Zmijewski & Hagerman, 1981). Using size as a proxy, larger firms had a net negative effect while smaller firms had a less negative effect and/or a net positive effect. Therefore, there was some cause to support the validity of the calculated income effects. The remainder of the paper develops a set of industry specific political cost variables to explain the net income effects calculated in this section.

Developments in the Pharmaceutical Industry

In recent years the pharmaceutical industry has been severely criticized and assaulted with mandatory pricing concessions and new taxes. Since the 1992 presidential campaign, the United States has begun to focus on health care costs. This continued focus on the pharmaceutical industry extends to the 2000 presidential campaign. Both major candidates acknowledged the high cost of prescription medication and the apparent need for greater prescription drug availability. Frequently pharmaceutical firm profits have been in the spotlight. It has been suggested by industry observers that the genesis of the health care cost issue started with the 1990 Pennsylvania Senate race between a popular Bush cabinet officer, Richard Thornberg (Attorney General), and Harris Wofford.

The primary reason given for Wofford's success related to his campaign, which focused almost exclusively on health care costs *(New York Times,* September 25, 1992). Seizing this momentum and public insecurity, the Democratic Presidential campaign similarly focused on health care costs. Then Governor Clinton campaigned on a plan that would include "rigorous cost controls on prescription drugs..." (New *York Times,* September 25, 1992). In response to this pressure, several firms declared that they would voluntarily limit prescription drug price increases to the inflation rate.

During the same time, Congress was enacting laws to force lower drug prices. As part of the Omnibus Budget Reconciliation Act of 1990, pharmaceutical firms were mandated to pay refunds to Medicare if they sold prescription drugs at a lower price to anyone else. Additionally, in October 1992 Congress passed the Prescription Drug User-Fee Act (PDUFA) which required pharmaceutical firms to pay the U.S. Food and Drug Administration substantial fees when submitting new drug applications. PDUFA also required pharmaceutical firms to pay an additional fee for each manufacturing 'establishment' and a fee for each product manufactured.

Subsequent to 1992 presidential election, the rhetoric against pharmaceutical firms increased. Various senators, specifically Senator Pryor (D-AK) and Senator Sasser (D-TN) proposed "action to reign in price rises [of prescription drugs] during the first 100 days of the Democratic administration" *(Financial Times -London,* November 5, 1992). In addition, the U.S. Congress Office of Technology Assessment published a report dated February 1993, which investigated the costs, risks, and rewards of pharmaceutical research and developments.[4] However, contrary to the title, the focus on the report was to determine whether the large returns earned on new chemical entities (i.e., new drugs) could be justified. In the report, the associated costs of new drug development were probably understated since they were working with rough estimates; likely ignoring the costs of failed research projects and their marginal contribution to new drug development.[5] The report went as far as to infer that Congress might want to look into limiting the patent life for new molecular entities.

The political pressures levied against the industry were sufficiently strong so that Bristol-Myers Squibb included a supplement with their 1992 annual report. The supplement provided the company's responses to the recent criticisms levied on the industry. The primary criticisms levied against the industry revolve around the notion that the industry is making unnecessarily high profits and that pharmaceutical firms are spending too much on advertising costs relative to research and development.

The market reaction to the escalating political debate was as expected. Starting after the October 1987 market crash, the *Value Line* ranking for timeliness of the pharmaceutical industry was 31st among 93 industries evaluated. By November 1990, the industry had risen to the top out of 97 industries evaluated. Beginning in February 1992, the ranking began to fall such that by August 1993 the industry was ranked 54th out of the 98 industries evaluated.

Based upon the previous discussion regarding management strategy and the environment, one would expect that an increase in political pressure being placed upon the pharmaceutical industry would cause firms to adjust to the changing environment.

Since the 1992 presidential election affirmed a definite change in the environment, the

TABLE 1
Value-Line Timelines Rankings of the Pharmaceutical Industry

Date of Evaluation	Pharmaceutical Industry Rank	Total Number of Industries
Nov-87	31	93
Feb-88	29	92
Nov-88	24	92
Feb-89	26	92
Nov-89	11	94
Feb-90	2	95
Nov-90	1	97
Feb-91	1	97
Nov-91	1	98
Feb-92	2	98
Nov-92	8	98
Feb-93	10	98
Aug-93	54	98

Source: *Value Line Investment Summary.* Value Line Publishing, Inc. New York, NY. 1987, 1988, 1989, 1990, 1991, 1992, 1993.

first full year in which companies could adjust their strategy was fiscal year 1993. However, if a firm's management could have anticipated the change, the significant changes would have occurred in fiscal year 1992. Since it would appear that company profits were the lightening rod for the criticism, short-term solutions to deal with the political pressure would have been to decrease accounting profits.[6] The most significant independent variables that explain the effect of an accounting and/or management strategy were expected to be politically linked variables. However, before selecting the variables, a brief description of accounting choice studies is presented.

Accounting Choice Studies - Positive Accounting Theory

Various theories exist that attempt to explain why a firm selects a certain accounting principle or set of principles. Ball and Foster (1982) described six worldviews, or perspectives, identified in accounting choice studies. While acknowledging the existence of alternative methodologies and perspectives, only one of these perspectives will be described, economic consequences theory or positive accounting theory. Within this perspective, the path-breaking studies include Jensen and Meckling (1976) and Watts and Zimmerman (1978). The common theme running through these works is the contract-

ing relationships between the firm and various external and internal parties.

Management strategies and accounting choices are a function of various contracts written to decrease naturally occurring conflicts (i.e., between managers and owners, between owners and bondholders). Agency theory is usually used to explain the genesis of the conflicts. The primary monitoring device used to insure adherence to the contracts is accounting numbers. It is assumed that managers will act in their own self-interest. Given the set of contracts and asymmetry in knowledge relating to the company, earnings management results (Schipper, 1989). Holthausen and Leftwich (1983) summarized the economic consequences, or costs, of asymmetrical information and contractual frictions:

Contracting costs encompass the costs of evaluating, negotiating, writing and renegotiating the terms of the contracts. Monitoring costs are the costs of becoming informed about performance under contracts, and evaluating compliance with the terms of the contract. When contracting and monitoring costs are embedded in the analysis, voluntary and mandatory choices of accounting methods affect the value of the firm, and the wealth of managers, auditors, regulators, and investors because these costs prevent some users of accounting numbers from costlessly undoing accounting changes (Holthausen & Leftwich, 1983).

Watts and Zimmerman (1978) hypothesized several causal linkages for this earnings management, centering on three distinctive contracting relationships, two explicit and one implicit. The two explicit contracts relate to management compensation agreements between managers and owners as well as lending agreements between owners/managers and bondholders. The implicit contract refers to the creation of political pressures.[7] The implicit contract is between companies that operate in the United States and U.S. citizens. Citizens allow the companies to operate within the border of this country as long as they do not harm or exploit the citizens. The various governments (federal, state, and local) act as agents on behalf of the citizens. Due to monitoring costs, company size, and higher company profits are proxies for the probability of harmful or exploitative behavior on behalf of the companies. It is the management strategy, which attempts to disarm frictions by using income-decreasing strategies, especially for larger companies. Han and Wang (1998) investigated whether firms that expect increases in earnings resulting from sudden product price increases use accounting accruals to reduce earnings and, thus, political sensitivity. Specially, oil and firms' accruals were in a period of rapid gasoline price increases during the 1990 Persian Gulf crisis. Their results indicated that oil firms' that expected to profit from the crisis used accruals to reduce their reported quarterly earnings during the Gulf crisis. In contrast to previous research, they found that the tendency to release good earnings news early as shown by the prior research, is reversed for oil firms during the Gulf crisis. Thus, their findings suggested that the benefits of disclosing "good news" (i.e., earnings increases) early may have been out weighted by political costs associated with timely releases of the information. One of the problems with past research in this area was that size was used as a proxy for this implicit contract. However, since a size variable had been used as an explanatory variable in unrelated research (Ball & Foster, 1982), the causal linkage between

political costs and accounting choice tended to be assumed without an underlying explanation of what size actually measured. The purpose for the discussion on political pressures in the pharmaceutical industry was to identify specific industry related political variables without relying upon size.

Selection of Political Variables

The pharmaceutical industry is a research-based industry. Successful research leads to patents. Assuming the resulting compound performs as intended (which is the real purpose of the drug approval process performed by the U.S. Food and Drug Administration (FDA)), the company is rewarded with as much as seventeen years of monopoly profits. However, since the drug approval process usually ranges from three to five years, the actual period of monopoly profits is less than seventeen years. During this period, management needs to price the drug so that the firm can recapture the costs of development and to fund future research projects. These monopoly profits are a primary source of political debate. One proxy for the political pressures would be the number of new drug applications (NDA) approved by the FDA. It was expected that this variable would vary inversely with the dependent variable (the net income effect from accounting and managerial choices). The NDA approval information was obtained from a report prepared by the FDA Office of Drug Evaluation *(Statistical Report).* Appendix 3 of the *Statistical Report* lists every new molecular entity (new drug) approved by FDA since 1950. Taking into account mergers since 1980, the total number of new drug applications approved by the FDA was determined for each of the sample firms. One means of determining the effect of past activities of pharmaceutical firms is to evaluate the retained earnings account. It is likely that firms, which made significant earnings in prior years, would be subject to significantly more political pressures than younger companies with recent patents. As such, the natural logarithm of beginning retained earnings should indicate whether this hypothesis is true. This variable should vary inversely with the dependent variable. There was some concern that since the dependent variable was based upon differences from industry norms, the model would be misspecified if the level of the financial independent variables were used. As such, a second difference variable was calculated based upon its difference from the industry, or sample, median. The profits earned by pharmaceutical manufacturers have been rationalized by the industry because these profits help finance future research.

The criticism levied against the pharmaceutical firms is that many firms spend as much or more in advertising as they do on research and development. The ratio of research and development expenses to advertising expenses was the desired variable to measure the political pressure due to perceived excessive advertising costs. For all firms in the sample, research and development expenses were readily disclosed. Advertising expenses were not normally disclosed in the annual report. However, whenever an individual expense is larger than 1 percent of revenues, the expense must be disclosed in Supplementary Schedule X of Form 10-K. For approximately half of the sample, advertising expenses were not separately disclosed in Supplementary Schedule X. As such, in

order to use the entire sample, Selling, General, and Administrative (SG&A) expenses were used in lieu of advertising expenses. The variable used, then, was equal to total research and development expenses divided by total SG&A expenses. (Both a level variable and a difference variable were calculated).

This independent variable was expected to vary directly with the dependent variable. When the numerator increases relative to the denominator the ratio increases. It was believed that this would create less political pressure. However, the possibility remains that this variable is a proxy for future monopoly profits and causes increased political pressure. These two competing effects of the underlying variable operate in different directions and thus there is no clear prediction for the sign of its coefficient.

The gross profit percentages earned were the fourth political proxy used.[8] The rationale for this variable lies in the notion that firms that make more gross profit are more likely to want to increase non-operating accruals to lower total net income. Politicians in making the case against the pharmaceutical industry by suggesting the industry earns "excess profits" often cite gross profit and net income. Rubin (1994) noted "some critics of the pharmaceutical industry use their accounting records to claim that there are large excess profits generated." A recent *New York Times* article indicates presidential candidate Al Gore believes industry profits are out of line and he is in favor of policies that will cut into profits and curb prices (July 1, 2000). This is the same rhetoric that Governor Bill Clinton used in 1992 to incite political pressure on the industry which served as the impetus for the 1993 U.S. Congress Office of Technology Assessment study into the profits earned by the industry. The political environment was so severe, Bristol-Myers Squibb added to its annual report a letter to its shareholders to respond to the charges levied against the industry. It is expected that this variable will have an inverse relationship with the dependent variable.

During the 1992 presidential election (and during the last eight years) politicians have focused on the "excessive profits" of corporations to convince the public that governmental action needs to be taken. Furthermore, the focus was on the pharmaceutical industry because part of the political debate of the time was to have universal heath care. The political climate against the pharmaceutical industry increased after the Democratic Congress, through its Office of Technology Assessment issued a report in 1993 claiming that the industry was earning excessive returns. The focus was on the accounting gross profit (sales minus cost of goods sold) and the accounting net income. Positive accounting theory suggests that managers understand the fuel for the political pressure and take steps to shift accruals to mitigate the political pressure.

Since that election, other industries come under similar political pressure, which provides fodder for future studies. For example, during the last decade, the banking industry came under political fire for earning what was considered "excessive profits." This was especially highlighted by the increased fees charged to customers and for which the industry was brought before Congress to explain their actions. Recently, Al Gore has blamed "Big Oil" for being greedy and for earning "excessive profits" at the expense of everyday working consumers.

Positive accounting theory suggests that managers understand the fuel for the political pressure and take steps to shift accruals to mitigate the political pressure. Jones

(1991) found discretionary accruals are income-decreasing in the year of import relief investigation by the International Trade Commission (ITC). The ITC is interested in earnings before taxes as one of the measures of injury to a firm so firms claiming injury by foreign competition have clear incentives to reduce their earnings. Similarly, Key (1997) considered the cable industry during periods of Congressional scrutiny. Her evidence was consistent with managerial incentives to mitigate the effects of political scrutiny and potential industry regulation. Hall and Stammerjohan (1997) reported that relative to a control group of oil corporations, managers of oil firms facing potentially large damage awards chose income decreasing non-working capital accruals. Again a level and a difference variable were calculated. It was expected that this variable would have an inverse relationship with the dependent variable. A factor analysis of these four political cost variables may be necessary to mitigate the effect of the anticipated levels of multicollinearity. If necessary, some or all of these variables will be linearly combined and treated as one variable in the regression.

Other Variables

Consistent with the positive accounting literature, contracting and monitoring costs associated with lending agreements and management compensation agreements could lead to management of earnings. From a manager's perspective, the costs of violating a debt covenant could have a significant impact on the firm and on his compensation. In terms of management strategy, it would be in the company's best interest to attempt to adjust the timing of discretionary accruals so as to insure that debt covenants are not violated. Much of the positive accounting research uses leverage as a proxy for the likelihood of violating a debt covenants. Press and Weintrop (1990) evaluated seven different leverage calculations that they found in the literature. To be consistent with Zmijewski and Hagerman (1981), leverage was defined as total debt divided by total assets. Both a level variable and a difference variable were calculated.

In reviewing management compensation packages, an examination of each firm's 1993 proxy statement was made. All companies used accounting numbers to determine some portion of management compensation. Since there was no real differentiation among sample firms relating to previously used dummy variables (e.g., Zmijewski and Hagerman, 1981), a new variable had to be created. While the individual proxy statements were phrased differently (some more explicitly explaining the determinants of executive compensation than others), it was believed that the substance of the compensation packages were consistent across the sample.

The number of scientists/medical professionals in upper management could influence the behavior of management concerning managerial and accounting strategies.[9] Three such variables were calculated. The first management variable (MGT1) focused on the top executive positions within each firm: Chief Executive Officer, President, Chief Operating Officer, Chief Financial Officer, and Executive Vice-President. It was assumed that this level of management sets the overall management strategy. The variable

consisted of the number of these executives possessing either a M.D., Ph.D., or both. It was hypothesized that the more technically educated the executive management, the less likely the firm will consider accounting strategies as part of the overall firm strategy and the less likely the company manages its earnings in response to political pressures.

The second management variable (MGT2) focused on all members of senior management, expanding upon executive management. Similar to MGT1, this variable was the number of senior management members with a M.D., Ph.D. or both. This variable measures the same management strategy focus as MGT1. However, it was a broader measure of management than MGT1. The final management variable (MGT3) was the percentage of senior management possessing doctoral degrees. This variable was calculated by dividing MGT2 by the total number of senior managers within the firm. MGT3 measures the same construct as MGT1 and MGT2, but is a scaled variable.

The source of the management variables was the annual report of the sample firms. The back cover, or within the last few pages, of the annual report lists the members of senior management. Thus, these three management variables were limited to the firm disclosures within their annual reports. The basic structure of the regression models used was the same for the level variables and the difference variables. However, since the results were substantially the same for both models, only the level model and results will be discussed. The model used follows:

$$EFFECT_i = \beta_o + \beta_1 DA_i + \beta_2 LRE_i + \beta_3 RD_i/SGA_i + \beta_4 GPPER_i + \beta_5 LVRGE_i + \beta_6 MGTN_i$$
$$(+) \quad (-) \quad (-) \quad (?) \quad (-) \quad (+) \quad (+)$$

Where:

$EFFECT_i$ = net income effect of accounting strategy for firm i.
DA_i = number of new drug applications approved by the FDA since 1980 for firm i.
LRE_i = natural logarithm of 1993 beginning retained earnings for firm i.
RD_i/SGA_i = research and development expense for firm i divided by sell ing, general, and administrative expense for firm *i*,
$GPPER_i$ = gross profit percentage for firm i.
$LEVRGE_i$ = total debt divided by total assets for firm i,
$MGTN_i$ = MGT1, MGT2 or MGT3 for firm i, where:
MGT1 = number of M.D.'s or Ph.D.'s in executive positions.
MGT2 = number of M.D.'s or Ph.D.'s in senior management positions.
MGT3 = MGT2/total number of senior management positions.

Results

Tables 2 and 3 provide descriptive statistics for the independent variables and a correlation analysis among the independent variables, respectively.

TABLE 2
Descriptive Statistics for Independent Variables

Variable	Mean	Median	Standard Deviation	Maximum	Minimum
DA	5.45	5.5	6.159	22	0
LRE	12.89	14.39	2.88	15.72	6.81
RD/SGA	0.4755	0.3505	0.5026	2.4812	0.0736
GPPER	0.6016	0.6704	0.1952	0.8315	0.1992
LVRGE	0.1809	0.1742	0.1133	0.4026	0.0123
MGT1	0.35	0	0.8127	3	0
MGT2	4.05	1.5	4.639	16	0
MGT3	0.1539	0.1414	0.1422	0.45	0

Notes:
DA = number of new drug applications approved by the FDA from 1980 to 1993
LRE = natural logarithm of 1993 beginning retained earnings
RD/SGA = research and development expense divided by selling, general, and administrative expense
GPPER = gross profit percentage
LEVRGE = total debt divided by total assets
MGT1 = number of M.D.'s or Ph.D.'s in executive positions
MGT2 = number of M.D.'s or Ph.D.'s in senior management positions
MGT3 = MGT2 divided by total number of senior management positions
Sample size = 20 firms
Data is for 1993

Table 3 shows the correlation analysis, which provides some interesting information. First, several of the political cost proxies were significantly correlated. Combining these variables (through factor analysis) would likely create a better variable for regression. Second, leverage was negatively correlated to the beginning balance of retained earnings. This was informative in that it indicates that firms with low levels of retained earnings must rely more upon debt financing to finance operations and research (perhaps an obvious relationship). Third, the correlation between the number of doctorate degree holders among firm executives and research and development expenses as a percentage of SG&A expenses was significant. A similar result is observed for senior management. An intuitive explanation might be that management dominated by individuals with scientific backgrounds is more likely to be interested in research and development.

TABLE 3
Pearson Correlation Coefficients

	DA	LRE	RD/SGA	GPPER	LVRGE	MGT1	MGT2	MGT3
DA	1							
	(0.0000)							
LRE	0.77343	1						
	(0.0002)	(0.0000)						
RD/SGA	-0.21659	-0.36968	1					
	(0.3590)	(0.1311)	(0.0000)					
GPPER	0.55953	0.5989	0.15639	1				
	(0.0103)	(0.0086)	(0.5103)	(0.0000)				
LVRGE	-0.29916	-0.65336	0.37737	-0.27575	1			
	(0.2001)	(0.0033)	(0.1009)	(0.2393)	(0.0000)			
MGT1	-0.06456	-0.38521	0.71889	0.17782	0.37459	1		
	(0.7865)	(0.1144)	(0.0004)	(0.4532)	(0.1037)	(0.0000)		
MGT2	0.52589	0.20821	0.22278	0.37007	-0.04299	0.28825	1	
	(0.0172)	(0.4070)	(0.3451)	(0.1083)	(0.8572)	(0.2178)	(0.0000)	
MGT3	0.15832	-0.10383	0.49163	0.29189	0.14819	0.57684	0.73527	1
	(0.5050)	(0.6818)	(0.0277)	(0.2118)	(0.5329)	(0.0078)	(0.0002)	(0.0000)

Notes:
Probabilities in parentheses are two-tailed
DA = number of new drug applications approved by the FDA from 1980 to 1993
LRE = natural logarithm of 1993 beginning retained earnings
RD/SGA = research and development expense divided by selling, general, and administrative expense
GPPER = gross profit percentage
LEVRGE = total debt divided by total assets
MGT1 = number of M.D.'s or Ph.D.'s in executive positions
MGT2 = number of M.D.'s or Ph.D.'s in senior management positions
MGT3 = MGT2 divided by total number of senior management positions
Sample size = 20 firms

Finally, there was a significant correlation between the number of new drug applications a firm has had approved since 1980 and the number of doctors in senior management. This correlation did not hold up when this variable, number of doctors, was transformed into a percentage of senior management. Table 4 provides the results of the regression analysis. Models 1, 2, and 3 provide further evidence that there was a multicollinearity problem.

When DA, LRE, and GPPER were in the same model, the variables were not significant at conventional significance levels. However, it appeared that these models do provide some explanatory value with adjusted R^2 values of .55, .54, and .63. When DA, LRE, and GPPER were included in the model individually (see models 4-9 in Table 4), each variable was significant. As such, these three variables were factor analyzed and linearly combined. In Table 4, RD/SGA were consistently, though insignificantly, negative. The variable was even marginally significant in model 5. This variable was difficult to interpret since it was unclear whether SGA or RD expenses were driving the effect. Both LVRGE and the MGT variables were insignificant. This was likely due to the high political costs imposed on the industry. Concerns over these costs appeared to be the driving force in determining whether a firm would follow an income-increasing or income-decreasing management/accounting strategy.

Table 5 indicates the results for the regression models using a political factor as an independent variable.[10] In all models, the political factor was highly significant. Similar results were also found for the other variables included in the model.

Overall the significance of the models was much better than those disclosed by Zmijewski and Hagerman (1981).[11] However, when a size variable, natural logarithm of total assets, was included in this model, the results were approximately the same as when the political factor was used.[12] The power of the model with the political factor lies in its construct validity and its linkages to the pharmaceutical industry environment. The similarity in results between the size model and the political factor model supports the validity of the political factor model.

Conclusion

The purpose of this paper was to address two of the criticisms of *Positive Accounting* research discussed by Watts and Zimmerman (1990). An attempt was made at calculating the net income effect of accounting and managerial choices, thus improving the dependent variable used in previous Positive Accounting research. The validity of the measure was supported by the fact that larger firms showed larger net negative income effects on their accounting choices. In contrast, smaller firms exhibited less negative or even positive effects. However, the limitations of this study were that the sample size was small and biased towards larger firms within the pharmaceutical industry. In addition, the industry average used to calculate the net income effects was actually the sample median.

With respect to the industry specific political variables selected, the variables were significant and in the hypothesized direction, except for the ratio of research and development costs as a percentage of selling, general, and administrative expenses. When

TABLE 4
Regression Results
Models One - Nine
(Level Variables Only)

Model	βo Intercept (p-value)	(-) β1 DA (p-value)	(-) β2 LRE (p-value)	(+) β3 RD/SGA (p-value)	(-) β4 GPPER (p-value)	(+) β5 LVRGE (p-value)	(+) β6 MGT1 (p-value)	(+) β6 MGT2 (p-value)	(+) β6 MGT3 (p-value)	Adjusted R^2	n	F value
1	1.097	-1.19	-1.266	-0.977	-0.414	0.542	-0.303	--	--	0.5513	18	4.481
	(0.296)	(0.259)	(0.231)	(0.349)	(0.686)	(0.598)	(0.767)	--	--			
2	1.027	-1.126	-1.223	-1.306	-0.0498	0.523	--	-0.054	--	0.5477	18	4.431
	(0.3263)	(0.2843)	(0.2469)	(0.2181)	(0.6283)	(0.6112)	--	(0.958)	--			
3	1.54	-1.062	-1.719	-0.719	-0.333	0.341	--	--	-1.584	0.6316	18	5.857
	(0.1517)	(0.31)	0.113	(0.487)	(0.745)	(0.739)	--	--	(0.141)			
4	-0.398	-4.571	--	-1.536	--	0.565	--	--	--	0.5248	20	7.994
	(0.6961)	(0.0003)	--	(0.1441)	--	(0.58)	--	--	--			
5	1.935	--	-3.607	-2.113	--	0.65	--	--	--	0.5645	18	8.346
	(0.0734)	--	(0.0029)	(0.053)	--	(0.5261)	--	--	--			
6	0.702	--	--	-0.041	-2.383	0.351	--	--	--	0.1913	20	2.498
	(0.4927)	--	--	(0.9682)	(0.0299)	(0.7303)	--	--	--			
7	-1.272	-4.604	--	--	--	--	--	--	--	0.5152	20	21.195
	(0.2197)	(0.0002)	--	--	--	--	--	--	--			
8	2.757	--	-4.216	--	--	--	--	--	--	0.4967	18	17.778
	(0.014)	--	(0.0007)	--	--	--	--	--	--			
9	1.277	--	--	--	-2.864	--	--	--	--	0.2749	20	8.203
	(0.2178)	--	--	--	(0.0103)	--	--	--	--			

Notes:
DA = number of new drug applications approved by the FDA since 1980
LRE = natural logarithm of 1993 beginning retained earnings
RD/SGA = research and development expense divided by selling, general, and administrative expense
GPPER = gross profit percentage
LEVRGE = total debt divided by total assets
MGT1 = number of M.D.'s or Ph.D.'s in executive positions
MGT2 = number of M.D.'s or Ph.D.'s in senior management positions
MGT3 = MGT2 divided by total number of senior management positions
Dependent variable (EFFECT) = net income effect of accounting strategy

TABLE 5
Regression Results
Models Ten - Fifteen
(Level Variables Only)

Model	βo INTERCEPT (p-value)	(-) β1 PLFTR (p-valu	(+) β2 RD/SGA (p-value)	(+) β3 LVRGE (p-value)	(+) β4 MGT1 (p-value)	(+) β4 MGT2 (p-value)	(+) β4 MGT3 (p-value)	Adjusted R^2	n	F value
10	0.825	-3.958	-1.325	0.847	-0.091	--	--	0.594	18	7.152
	(0.4244)	(0.0016)	(0.2080)	(0.4122)	(0.9287)	--	--			
11	0.869	-3.672	-1.831	0.853	--	0.219	--	0.5927	18	7.184
	(0.4007)	(0.0028)	(0.0901)	(0.4092)	--	(0.8300)	--			
12	1.067	-4.019	-0.924	0.769	--	--	-1.422	0.6462	18	8.763
	(0.3053)	(0.0015)	(0.3724)	(0.4555)	--	--	(0.1785)			
13	0.88	-4.121	-1.966	0.874	--	--	--	0.6204	18	10.26
	(0.3939)	(0.0010)	(0.0694)	(0.3970)	--	--	--			
14	2.51	-5.518	-1.8	--	--	--	--	0.6263	18	15.248
	(0.0240)	(0.0001)	(0.0921)	--	--	--	--			
15	1.702	-4.89	--	--	--	--	--	0.5741	18	23.913
	(0.1081)	(0.0002)	--	--	--	--	--			

Notes:
PLFTR (Political Factor) = linear combination of DA (number of new drug applications approved by the FDA from 1980 to 1993), LRE (natural logarithm of 1993 beginning retained earnings), and GPPER (gross profit percentage).
RD/SGA = research and development expense divided by selling, general, and administrative expense
LEVRGE = total debt divided by total assets
MGT1 = number of M.D.'s or Ph.D.'s in executive positions
MGT2 = number of M.D.'s or Ph.D.'s in senior management positions
MGT3 = MGT2 divided by total number of senior management positions
Dependent variable (EFFECT) = net income effect of accounting strategy

the three significant political variables were linearly combined using factor analysis, the resulting political factor was highly significant in explaining the effect of the accounting and managerial choices. Thus, the political cost hypothesis was confirmed. The other variables were not significant in the regression analysis. However, interesting significant correlations were identified between the number of doctors (M.D.'s or Ph.D.'s) in senior management roles with the number of approved DAs since 1980 and with the ratio of research and development expenses to selling, general and administrative expenses. Areas of further research might include increasing the sample size to encompass all public pharmaceutical firms. In addition, examining the changes in accounting policies of the pharmaceutical industry over time could provide a more dynamic analysis. Furthermore, the methodology employed in this study could be extended to additional industries under public and political scrutiny (Han and Wang, 1998).

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Endnotes

[1] Schuetze (1993) suggested that part of the legal liability problems of auditors center around this issue. This issue was also discussed in some length in a report entitled: Strengthening the Professionalism of Independent Auditors for the Public Oversight Board of the SEC Practice Section of the AICPA (1994).

2 The mean inventory turnover for the sample was 2.57 times with a standard deviation of .86. The median inventory turnover was 2.33 times. The lowest turnover value in the sample was 1.23 times and the highest was 4.26 times.

[3] The data necessary for calculating the research variables was collected from the footnotes of 1993 financial statements provided in the annual report. This study has collected data from the 1993 annual report due to the prevailing political environment of 1992 and 1993. Since then there has been no time when the political environment has been so anti-pharmaceutical industry, with the possible exception of the 2000 presidential campaign. In addition, a theory of accounting discretion must also take into account the incentives and politics of standard setters (Watts & Zimmerman, 1979). The Securities

and Exchange Commission (SEC) chairman, Mr. Arthur Levitt, has indicated enhanced SEC scrutiny of firms that announce major write-offs or participate in other practices consistent with earnings management (Levitt, 1998).

[4] The report was entitled: Pharmaceutical R & D: Costs, Risks, and Rewards.

[5] Similar arguments have been made in the oil and gas industries relating to the full costing versus successful efforts debate.

[6] Another response of several large pharmaceutical firms with drugs under patent protection has been to purchase generic drug firms. There are two effects of such a management decision: gross profit percentages would decrease since generic firms earn lower margins on their products; and larger firms would be able to capture a significant portion of the generic market for their drugs once they lose their patent protection (after 17 years or by government fiat). Such mergers are currently under investigation by the FTC (Business Week, September 5, 1994, p. 67).

[7] Holthausen and Leftwich (1993) advanced a similar argument.

[8] The gross profit percentage equals gross profit divided by net sales.

[9] Advanced degrees such as M.D.s and Ph.D.s signal to interested parties that science is an integral part of a pharmaceutical firm's mission. Firms attempt to highlight these degrees in all public disclosures. Confirmation of this assertion was provided by individuals working within the industry and by regulators. In addition, we have consulted with experts within the industry to support the validity of our assumption regarding the importance for firms to disclose the expertise of the management team. The industry (as well as all biomedical industries) relies on science. One of the most effective ways of disclosing expertise and credibility within a scientific field is to show (even highlight) the education level of its members. Pharmaceutical firms must highlight the advanced degrees of its officers simply to convince the public (whether investors, regulators, physicians and users of drugs) that experts run these companies. While this may simply be for public relations, it is a significant part of the industry. Public perceptions of the industry are important. For this reason, the pharmaceutical industry is different from most other industries.

[10] The political factor was composed of a linear combination of DA, LRE, and GPPER. Factor analysis provides standardized scoring coefficients, which allow the variables to be linearly combined.

[11] Their Pseudo R^2 values ranged between .08 to .10.

[12] When only the political factor was used as an independent variable (see model 15 in Table E) the R^2 of the model equaled .5741 with an F value equal to 23.913. When the natural logarithm of total assets was used as the only independent variable (not shown) the R^2 of the model equaled .5545 with an F value equal to 24.647.