Division of Research
Graduate School of Business Administration
The University of Michigan

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GENERAL PRICE-LEVEL ADJUSTED PERFORMANCE MEASURES FOR 309 FIRMS, 1964-73

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by

Daryl Winn
University of Colorado

FOR DISCUSSION PURPOSES ONLY

PREFACE

The purpose of this study was to extend a previously developed computer model which adjusted fixed assets and depreciation for the effects of inflation to make adjustments for inventories and monetary items. Assistance of Jeffrey Raymon in computer modeling is acknowledged. I am grateful to the Business Research Division and the College of Business and Administration at the University of Colorado for financial support. I am very thankful to the Division of Research at the Graduate School of Business Administration, The University of Michigan for providing computer time and programming assistance. I am especially grateful for the continued, very capable programming assistance of Kathleen Goode at the Division of Research.

CONTENTS

TABLES

I

INTRODUCTION

Business profits are distorted during and after periods of inflation because of the accounting practice of subtracting the number of "cost" dollars expended, perhaps years ago, to acquire assets from the number of current "revenue" dollars without accounting for the differences in the purchasing power of those dollars. This occurs because assets (and liabilities and equity) are valued through time in terms of the number of dollars only and not in terms of the purchasing power therein represented. There are three major factors which lead to the distortion of performance measures.

First, depreciation of fixed assets is understated in the income statements which results in an overstatement of corporate profits, and fixed assets are understated in the balance sheet which understates the amount of resources used to generate those profits. Hence, rates of return (a widely used measure of performance) are doubly affected for firms in times of inflation. Second, inventories (especially if LIFO is used) and the cost of goods sold (especially if FIFO is used) is understated, and consequently reported profits are, again, overstated and investment is understated. Third, firms are both lenders and debtors. If monetary liabilities are greater than monetary assets, the firm gains because of an

eventual repayment of debt (that is fixed in terms of the number of dollars) with dollars that are worth less in terms of purchasing power.

Scope of Purpose

This study compares accounting measures of performance and financial position for 300 of the largest industrial firms for the period 1964-1973 as they are currently reported and as they would be reported to stockholders with general price-level adjustments per the Financial Accounting Standards Board proposals.[1/] A computer model has been developed to estimate the general price-level or restated income and balance sheet accounts for fixed assets, inventories, and for monetary gains and losses for each of the ten years for each firm.

The immediate purpose of this study is to provide evidence on the effects of general price-level (GPL) adjusted financial statements and to encourage the adoption of the FASB proposals. This study addresses only the importance, relevance and usefulness of price-level adjustments in general and does not address more specific questions of disclosure methods, classification of monetary and nonmonetary items, special treatment accounts, the accuracy and practicality of short-cut methods, or the like.

The primary purpose is not to determine the impact on any particular individual firm's performance and financial measures, which are of interest to that firm's managements, accountants, and investors. Instead, the primary purpose is to determine the effect of general price-level adjustments

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[1/] Financial Accounting Standards Board, Status Report, December 31, 1974.

on aggregate data as would be used by investors, in general, to assess the general climate of business activity, and as would be used by government in developing public policy. Also, the purpose of this study is to compare the effects on the questions of resource allocation among the various industries and firms.

These issues are addressed by comparing reported and general price-level measures of rates of return, earnings retention, effective tax rates, capital expenditure coverage ratios, debt-equity ratios, growth rates, and inventory-sales ratios for the entire ten-year period from 1964 to 1973 and for the two five-year sub-periods of 1964 to 1968 and 1969 to 1973. These two periods are characterized as high growth with moderate inflation and as moderate growth with high inflation, respectively.

By using a great number of the largest U.S. firms from all types of industries (excluding utilities and financial institutions) and the long time period, this study can address important macroeconomic issues regarding the impact of general price-level adjustments. Though these macroeconomic issues have been previously ignored in empirical studies, they should be of concern to the accounting profession as a whole and also to the Securities and Exchange Commission as they discharge their respective responsibilities.

Comparison With Other Studies

Over the years many studies of the effects of GPL statements have been conducted. Two of the recent empirical studies are by Petersen and

by Davidson and Weil.[1/] These studies emphasize the effects on performance measures as they might affect the firm's management or its investors. These and other studies have examined the impact on a few firms, or the relative performance of firms within a single industry. Always the emphasis centers on the firm, its management and its investors. Less concern is given to the larger issues of the allocation of resources between the industries, within say the manufacturing sector, or to the implications on the allocation of resources (or distribution of income) between capital and labor, or between the business and all other public and private sectors of our economy. Finally, little empirical evidence has been accumulated on the propriety of general price-level adjustments and their effect on aggregate data as would be used in the formulation of public policy toward business. To this end, this study is distinguished from previous empirical studies in three ways.

First, the number of firms and industries under study is larger. The basic data base is the Standard and Poor's Compustat tapes. These tapes have annual financial data for over 2,000 firms. Because of data, and other constraints, the panel is reduced to a little over 300 of the largest industrial firms representing more than 80 industries.[2/] With so many firms

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[1/] Russell J. Petersen, "Interindustry Estimation of General Price Level Impact on Financial Information," The Accounting Review 48 (January 1973): 34-43; Sidney Davidson and Roman L. Weil, "Inflation Accounting," Financial Analysts Journal, January-February 1975, pp. 27-31 and 70-84, and "Inflation Accounting: Public Utilities," Financial Analysts Journal, May-June 1975, pp. 30-34, 62.

[2/] Only forty-three of the 309 firms are outside of manufacturing. These are seven mining firms, four trucking firms, ten airlines, eight retail department stores, nine retail food stores, three retail apparel stores, and two retail drug stores.

from so many industries, it is not possible to use annual reports or other special data sources to obtain additional information to tailor the adjustments to any high degree of appropriateness for each firm or industry.

Second, this study is distinguished from several previous studies in that it makes adjustments to both the income statements and statements of financial position. This allows estimates of the effects on rate-of-return measures necessary for comparison of the effects across firms and industries, at given points in time, and for the same firms and industries over time. It is the author's belief that the most useful and important measure of the firm's performance is its rate of return, especially when the data are to be used in shaping public policy. Though the effects of GPL adjustments on various rate-of-return measures are emphasized, other common financial measures are compared.

Third, this study is distinguished from other studies because of the relatively long time period covered. Requisite data for the approximately 300 firms is available for the 1955 to 1973 time period. Although rates of return (and the other financial measures) are analyzed for the ten-year period from 1964 to 1973, data for the entire nineteen-year period is necessary. The reasons follow from the methodology used to estimate balance sheet variables (e.g., inventory and fixed assets) for beginning-of-year 1964.

General Price Level Adjustments

It is not the purpose of this study to argue the separate cases for general price level adjustments or current cost adjustments. A few comments are appropriate, however. It is my view that the best measure of

economic profits are profits adjusted for current or replacement costs. Replacement costs appear most appropriate when issues of the future economic growth, inflation, and unemployment are of concern. It would appear that the relevant question facing investors in the securities market or public policy makers concerned with these issues is whether there exists the incentive and capability of business to replace and expand productive capacity at current prices.

For this purpose, operating profits must be separated from holding gains, a separation which, in my view, is the single most important and distinguishing feature of the use of replacement cost adjustments as opposed to GPL adjustments. By subtracting the replacement costs of inventory sold and depreciation from current revenues, the result is operating profits. This profit concept best measures a firm's incentive and capability to continue operating. Theoretically, if zero operating profits are retained, the firm is just able to replace assets used to generate revenues. In other words, replacement cost profits measure the adequacy of cash flows required (eventually, if not immediately in the case of long-lived assets) to replace these assets.

Though firms may gain from holding, borrowing, and operating activities, for purposes of public policy and resource allocation, the separation of profit components is important because each results from distinct phenomena. It is assumed that, sooner or later, management will direct the firm toward those activities which provide gain and away from those activities where there is little or no gain. For example, a "profitable" firm with a large holding or borrowing gain and an operating loss might be encouraged to reduce production, lay off its workers and simply hold (or

acquire with the issuance of debt) those assets which appreciate in value. Management's desire to minimize operating losses may be contrary to the public policy goals of economic growth, full employment, and price stability which depend on production (operating profits) as the source of income.

Real holding gains, occurring when specific prices rise more rapidly than do prices in general, are only a disaggregate phenomena. For society as a whole, there are no holding gains. In theory at least, one firm or person's gain is offset by another's loss and, therefore, for measuring Gross National Product or National Income, holding gains are irrelevant. This occurs because "prices in general"--measured, though perhaps imperfectly, by the GNP implicit price deflator--represent the weighted-average movement of all these price indices. In short, holding gains on nonmonetary assets and "general purchasing power" gains and loss on monetary items are only immediately and directly relevant to the distribution, and not to the level, of aggregate income. It is noted, however, that the distribution of income to various claimants--e.g., labor vs. providers of capital, or debt holders vs. equity holders--will, through the incentives, affect the extent and type of participation in the economic process, and will, therefore, indirectly affect the level of total economic activity.

Although in some circumstances management might be held accountable for holding gains as part of normal activities of business enterprise, in the longer run investment and resource allocation decisions must be predominantly motivated by operating and not by timing or financing benefits. Real investment decisions (expansion by existing firms or entrance by a potential competitor) would be dominated by the long-run considerations of

market share, and conditions of demand and supply. That is, the decision would be based on a careful analysis of the operating profit potential of the industry in question rather than on the expected movement of fixed asset prices or money capital costs based on an analysis of the capital goods and construction industry or on an analysis of the money markets.

Theoretically, the best measure of an individual firm's current and future performance is operating profits obtained through the use of replacement costs and the elimination of holding (and borrowing) gains. Unfortunately, for individual firms the use of replacement costs raises the serious problem of objectivity.

The purpose of this discussion now becomes clear. I argue that, contrary to others' views, general price-level adjustments offer a reasonable compromise. First, because they do not represent any departure from the historical-cost concept, general price-level adjustments leave objectivity unaffected for individual firms and their accountants. Second, for purposes of public policy and in the national interest, general price-level performance measures may be identical to current cost measures. This is true to the extent that accounting data are aggregated across all income-producing units. To the extent that these data are aggregated, real holding gains (and general purchasing power gains and losses) in some units are offset by holding losses in others.

Therefore, in issues of national impact, the question of whether replacement costs or general price-level adjustments are more appropriate is not one answered by polemics, but one answered by observation of the real world. To what extent does the GNP implicit price deflator represent the weighted average of prices of business inputs and outputs in aggregate or

for the relevant business sample. The question then necessarily involves a discussion of defining the relevant business community. This line of reasoning suggests that the debate, insofar as it concerns aggregate data, on replacement cost versus general price-level adjustments, might better seek resolution by selecting an index (perhaps other than the GNP deflator) which does represent the movement of prices of business inputs and outputs.

Finally, if we visualize the firm as one of many income producing units in our economic system, general price-level statements (excluding general purchasing power gains and losses) measure the net contribution of that single enterprise to real national income and product. Thus, general price-level statements are useful for longer-run forecasts of individual sectors (manufacturing, utilities, business, nonbusiness) to the extent that in the long-run, transfers of wealth between sectors (or between debtors and lenders) via inflation are netted to zero. That is, no sector gains at the expense of other sectors because of inflation. One may wish to go so far as to define the appropriate deflator to be used in general price-level adjustments as that price index which eliminates all holding gains when the data are aggregated for the relevant business community.

In summary, the arguments that are advanced in favor of current-cost accounting data, as the best measure of individual firm performance used by investors, may be equally appropriate for general price-level data, as the best measure of aggregate performance measures used in determining tax, energy, wage-price control policies, and other public policy actions. The advantage of general price-level adjustments, however, is that they do not affect objectivity because they do not represent a departure from historical costs for the individual firm.

II

METHODOLOGY OVERVIEW

This section outlines the short-cut methods used in this study for general price-level-adjusted financial data. These methods are, at times, crude because the large number of firms, the variety of industries, and the number of years involved precludes special treatment for individual firms or industries. The methods are designed to yield reasonable estimates of the impact of GPL adjustments given only generally available (public) data. Because Standard and Poor's Corporation Compustat tapes are the basic data source, the methods are constrained by nature of the data therein available. The most serious deficiencies with the data on the Compustat tapes (and other public sources as well) are: (1) failure to separate inventory method and dollar amounts by materials, work in process, and finished goods; and (2) failure to separate fixed plant into land, depletable resources, structures or machinery, and equipment.

The three adjustments which comprise the bulk of the impact of GPL adjustments are for inventories (cost of goods sold), depreciable fixed assets (depreciation) and for monetary gains and losses. Short-cut methods are developed to estimate these adjustments for the approximately 300 firms in this study for the period 1964-1973. Both balance sheet and income statement variables are adjusted. The adjustment procedures for these

three adjustments are given below. Adjusted or restated stockholder's equity is computed by the residual method, i.e., finding the amount of GPL adjustment to assets and adding that to reported stockholders' equity.

The FASB exposure draft classifies balance sheet items as monetary or nonmonetary. It is not possible in many cases to determine whether and to what extent certain accounts on the Compustat tapes are monetary or nonmonetary. For example, prepayments are not shown separately on the Compustat tapes, and the account of "Investments and Advances to Unconsolidated Subsidiaries" on the tapes does not allow a break out of monetary versus nonmonetary balances. Also for accounts such as deferred taxes, which the FASB treats as a nonmonetary item, there is no reasonable basis for estimating appropriate adjustments. Therefore, for these types of problems, the treatment is to ignore adjustments, i.e., carry the balances at reported values.[1/]

In summary, then, the approach is to adjust only those accounts we can reasonably identify as monetary or nonmonetary and for which we can develop, in the case of nonmonetary items, a procedure to estimate the date of original record. For all other items, no adjustments are made.

[1/] For most firms, other nonmonetary account balances will be small. Two accounts, however, namely Investments in and Advances to Consolidated Subsidiaries and Intangibles may be quite large. The first would be large if the company were a holding company. Because there is no reasonable basis for determining the dates or layers of acquisition of these nonmonetary accounts, we have eliminated those firms where the accounts are large. If either account is greater than 20 percent of total assets, or if the total of the two is greater than 30 percent of assets, that firm is eliminated.

Restatement Procedures

For the nonmonetary accounts of inventories and net plant, the procedure is to first restate them for 1963, in end-of-year dollars. Once inventories and net plant are stated to 1963 dollars, we begin rolling these forward for the years 1964-1973 and calculate the associated impact on the income statement.

Inventories

The Compustat tapes have the predominant inventory method used in each year as variable number 59. The methods listed are FIFO, LIFO, average cost, and standard cost. For some firms, for some years, more than one method is indicated. In that case, because the method listed first is the predominate method, and there is no way of determining the relative importance of the other methods, the entire inventory is treated as being handled by the first method indicated. It is also assumed that standard costs approximate a FIFO method. Therefore, procedures to estimate inventory and cost of goods sold are developed only for LIFO, FIFO, and average cost. The resulting methodology is similar to Davidson and Weil's methods to estimate cost of goods sold for 1973 for sixty large companies.

The basic assumptions are that "purchases," or costs associated with the total inventory figures, occur evenly throughout the year. Purchases are calculated by using beginning and ending inventory figures and cost of goods sold which are given on the Compustat tapes. We also assume a periodic inventory procedure as opposed to a perpetual one. With these assumptions, it is possible to estimate the amount and acquisition date of purchases that went to cost of goods sold and, in the case of an increase in

inventories, the amount and date of those going to ending inventory. For example, under FIFO, if purchases were calculated to be $240 ($20 per month) and inventory increased by $60 during the year, then we can adjust the $180 of goods which were sold (restated to year-end dollars) because these were calculated to have been acquired during the first nine months of the year. In fact, we assume they all were acquired at four and one-half (9/2) months from the beginning of the year. Having calculated the "date" of acquisition, the appropriate general price index at that time can be determined. In similar fashion, the $60 of goods going to ending inventory can be restated. Similar procedures are developed for LIFO.

For average costs, "purchases" are restated using the mid-year index and are then added to restated beginning-of-year inventory. The restated goods available for sale are split to inventory and cost of goods sold in the same proportion as are reported costs. Once beginning-of-year inventories are restated, the process of maintaining restated inventories and restated cost of goods sold is comparatively straight forward following the procedures outlined above. To initialize restated inventory at year-end 1963 for FIFO and average cost, we assume that all goods in ending inventory were acquired in 1963. For LIFO, the process is more complicated.

LIFO, 1963, ending inventory is composed of layers acquired over previous years. To determine the years in which the various layers were acquired, we calculated each previous year's change in inventories going back to 1955. An increase in inventory in year t becomes a layer of 1963 inventory acquired in that year, unless it is determined to have been sold in subsequent years (if inventories decreased). This layer is then restated from year t dollars to year-end 1963 dollars. The 1955 inventory

is assumed to have been acquired in 1954. These restated layers are accumulated to arrive at year-end 1963 restated inventory. Once these layers of 1963 inventory have been identified, restated inventories for all subsequent years are easily obtained, if inventories are increasing.

When inventories decline, all or part of a previous layer must be reduced or eliminated from the existing restated inventory. Having previously determined the date of acquisition and amounts of existing layers, the methodology yields the proper restated amount of inventory which went to the current year's cost of goods sold.

Fixed assets

As with most forms of public data, the Compustat tapes present only the total of land, depletable resources and depreciable assets in the plant account. It is therefore necessary to treat the entire amount as if it were amortizable property. For the great majority of firms in most industries, this represents no problem.[1/] For the extractive industries, however, and for the manufacturing industries where extraction may be a significant portion of total business (petroleum refining and the primary metals), distortions may arise. These distortions arise because net plant is calculated by assuming a straight-line depreciation policy. To the extent that an industry has large land and depletable resource holdings whose cost should not be amortized in a straight-line fashion, the results must be interpreted with caution. As will be explained shortly, however, these problems are somewhat reduced in importance because in the following

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[1/] For example, the ratio of land to depreciable assets was 2.3 percent in 1963 for all manufacturing corporations.

analysis we are primarily interested in assessing the impact of general price-level adjustments on financial data. Consequently, the resulting GPL results are not compared to reported results, but they are compared to the results which would have been obtained if the estimated lives and straight-line depreciation policies were, in fact, followed by the firm.

The overriding purpose of the methodology outlined in the following paragraphs is to estimate the effects of going to GPL statements and not the resulting GPL data in and of itself. Precise estimates of what GPL data would be for any firm or particular industry for a given time period is not the intent here. Rather the intent is to illustrate the effects of GPL adjustments on firms and industries with different growth and inventory turnover rates, useful lives of long-life assets, degrees of capital intensity, and money capital structures.

A common methodology is to estimate the average useful life of fixed assets by finding the ratio of year-average gross plant-to-depreciation charges. In this study, useful life is estimated as the 1964-1973 average of these ratios. Even if a firm uses an accelerated depreciation method, a reasonable estimate of useful life will result. Next, the typical study will estimate the date of acquisition or the number of years ago the plant was acquired by, for example, multiplying the ratio of accumulated depreciation to gross plant by this useful life estimate. Restated gross plant is then found by multiplying reported gross plant by the ratio of the current year's price index to the index at the determined date of acquisition. This methodology is not followed in this study. Instead, this study explicitly accounts for the temporarily uneven accumulation of capital stock and the uneven historical rates of inflation.

To estimate restated gross and net plant and restated depreciation involves an analysis principally of changes in gross plant and capital expenditures. By assuming a first-in, first-out flow of fixed assets, we can estimate when the gross plant as of year-end 1963 was acquired. This is accomplished by accumulating capital expenditures in reverse, beginning in 1963, and continuing backward until that gross plant balance is reached or until 1955.

These "layers" of 1963 gross plant (prior years capital expenditures) are assumed to have been acquired at mid-year. Each layer is then restated to 1963 year-end dollars. We begin with beginning-of-year 1964 because rates of return are based on year-average assets or stockholder's equity figures.

Having dates and amounts of the layers of 1963 gross plant, a weighted-average age of plant is calculated. Assuming a straight-line depreciation policy (with no salvage value), the net plant is calculated by multiplying gross plant by the ratio of age to estimated useful life. Having restated 1963 gross and net plant, the restatement of subsequent years is accomplished by bringing the beginning-of-year balance forward one year (aging plant one year and restating to next year's dollars) and adjusting for the current year's capital expenditures and retirements.[1/] Restated depreciation is calculated by dividing average gross plant by the useful life estimate.

It is clear that the differences between reported depreciation (and net plant) and restated depreciation result from the use of different

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1/ Gross retirements are calculated by comparing the change in gross plant with capital expenditures.

monetary units and the assumptions and procedures used. Because this study emphasizes the impact of going to general price-level adjustments rather than the resulting financial data, in and of themselves, the restated data are compared to nonprice-level-adjusted data computed under the same assumptions. That is, nonrestated net plant and depreciation are calculated by procedures identical to the restated data, except price indices are not used. These adjusted data are called historical-cost data to be distinguished from reported data.[1/] Throughout this study, when comparisons between GPL restated data and nonrestated data are made, these historical-cost data are used instead of reported data. The comparison of these results then measures the effects of general price-level adjustments were all firms to use a straight-line depreciation policy for reporting to stockholders.

Monetary gains and losses

Monetary assets are defined to be the sum of cash and cash equivalent (Compustat Data Item 1) plus receivables (item number 2). Cash and equivalent include, among other items, marketable securities (including stocks) and CDs.

Monetary liabilities are defined as the sum of current liabilities (item 5), long-term debt (item 9), and preferred stock (item 10). Preferred stock is entered at its liquidating value, as opposed to its redemption value, and is therefore treated as entirely monetary. Deferred taxes and the deferred investment credit are not included with monetary liabilities per the FASB recommendations.

[1/] Hopefully, this label will not be too confusing because all data in this study are forms of historical-cost data.

Average monetary assets and liabilities are calculated as the average of beginning-of-year and end-of-year balances. The difference between average monetary assets and liabilities becomes the net monetary position from which the gains or losses for the year are calculated. It is explicitly assumed that changes in these accounts occur evenly throughout the year. It is possible, however, that accounts show dramatic changes during the fiscal years and, therefore, could distort the results.

Key Variable Definitions

In this study there are more than 100 variables defined and calculated for each firm for each year from the original twenty-six Compustat variables. From these variables we obtain a few key variables which are used in the analysis which follows.

Briefly, the procedure is to take the Compustat reported balance sheet and income statement accounts for each firm for each year and calculate reported and restated financial measures. These financial measures (rates of return, debt/equity ratios, etc.) are then averaged for the 1964-68, 1969-73, and 1964-73 periods. The effects of general price-level adjustments are, in large part, determined by comparing rate-of-return performance measures. Rates of return on investment are used because they capture the effects of adjustments on both the key balance sheet and income statement accounts. Before-tax returns are calculated for all money capital suppliers (total assets) and both before- and after-tax returns are calculated on common equity.

Profit measures are defined to represent profits earned through normal operating activities. Therefore, the profit measures for every return

calculation exclude extraordinary items and earnings from unconsolidated subsidiaries. Included in the profit measures are minority interests. Appropriate adjustments are made in the investment base definitions. For example, investments in and advances to unconsolidated subsidiaries (Compustat item 31), and excess equity in unconsolidated subsidiaries (item 53) are eliminated, and minority interest equity (item 38) is included in the investment base calculations. In calculating returns, the average of beginning-of-year and end-of-year assets or common equity is used.

Return measures

Three reported rate-of-return measures are calculated: (1) operating returns before taxes (ORB) calculated as earnings before taxes and interest (EBIT) divided by average total assets (ATA), (2) stockholder returns before taxes (SRB) calculated as earnings before taxes (EBT)--after interest and preferred dividends--divided by average common equity (ACE), and (3) stockholder returns after taxes (SRA) calculated as earnings after taxes (EAT) divided by average common equity.

As was discussed in the fixed asset method overview, restated fixed asset values and depreciation charges are compared to similarly computed (but unadjusted for GPL changes) measures. These measures are labeled "historical cost measures." These three return measures are denoted as HORB, HSRB, and HSRA, corresponding to the three respective reported return measures. The corresponding profit measures are HEBIT, HEBT, and HEAT, respectively.

The restated return measures take these basic measures and adjust net plant and inventory by the appropriate price index ratios, and then adjust

depreciation and cost of goods sold. The restated investment base is calculated by first determining the differences between the three alternative measures of net plant, i.e., reported, historical, and restated. Total assets or equity, adjusted for these alternative measures, are computed simply by adding this adjustment to reported assets or equity amounts. Similarly, the difference in reported and restated inventory (the inventory adjustment) is added to the reported investment bases. Again, and in summary, the approach is to adjust the assets side of the balance sheet for inventories and fixed assets and then to take these implied changes across to the equity side.

Profits are restated by assuming that all revenues and expenses, other than cost of goods sold and depreciation, occur evenly throughout the year. The net of revenue and these other expenses are restated to end-of-year dollars. From this figure is subtracted the calculated restated cost of goods sold and depreciation amounts in end-of-year dollars. For the after-tax-and-interest profit measures, restated interest, preferred dividends and taxes are subtracted. The restated profit measures corresponding to those previously defined are denoted as REBIT, REBT, and REAT, respectively.

In addition to these restated measures, the calculated general purchasing gains and losses on monetary assets and liabilities (labeled net borrowing gains) are added to earnings of common stockholders before and after taxes. These are denoted as REBTM and REATM.

These five restated profit measures, when divided by the appropriate restated investment base, result in five restated return measures. Corresponding to previous notation, these are denoted as RORB, RSRB, RSRA, RSRBM, and RSRAM.

In summary, we have eleven rate-of-return measures for each firm for each year--three reported, three historical, and five restated return measures. The three period-average measures (1964-68, 1969-73, and 1964-73) are obtained by taking simple averages of the yearly returns.

Other financial measures

In addition to using rates of return to assess the impact of GPL adjustments, several other important financial measures are calculated and analyzed. The purpose of these measures is to assess the impact of GPL adjustments on performance and financial measures for different firms under different rates of inflation and federal government policy actions. Discussion of the specific use and interpretation of these variables is conducted in the section "Results and Analysis."

Three effective tax rates, calculated as income taxes divided by reported, historical, and restated earnings before taxes (EBT, HEBT, and REBT) plus preferred dividends, are used to demonstrate the differential impact of tax policy and inflation on the various firms. Two variables measuring the ratio of earnings retained (historical and restated) plus depreciation charges to capital expenditures are calculated. These are denoted as the capital expenditure coverage ratios. Inventory-to-sales ratios, frequently used by economists as an indicator of future economic activity, are calculated using reported and restated inventory figures. The impact of inflation on debt-equity ratios is determined by comparing calculations based on historical and restated equity figures.

The importance of the several GPL adjustments on reported earnings after taxes and interest are calculated as the ratios of (1) the adjustments

to cost of goods sold; (2) the adjustments to depreciation; (3) the adjustments for monetary losses from holding gross monetary assets; (4) the adjustments from gross borrowing; and (5) the adjustments for net monetary losses or gains all divided by restated earnings after taxes with net monetary gains and losses included (REATM).

Finally, measures and adjustment figures for absolute profit and earnings retained are calculated and compared. Because restated profits are in their respective end-of-year dollars, however, these measures are first restated to 1973 end-of-year dollars. These measures are compared to reported data to assess the impact of GPL adjustments on the temporal pattern of profits as they might be presented in the historical summary of financial reports or aggregated and used in public policy decisions.

III

RESULTS AND ANALYSIS

This section presents the results of general price level (GPL) adjustments for 1964-1973 for 309 firms. It begins with a detailed discussion of the nature of the adjustments by taking the Chrysler Corporation 1973 income statement data as an illustration. Next, the impact of the adjustments for twenty of the Dow-Jones thirty industrials are compared. Third, firms are categorized by high and low capital-output ratios, growth rates, debt-equity ratios and total asset sizes. The effects of GPL adjustments are then compared. Fourth, the results for fifteen selected industries comprising 99 firms are compared. Finally, aggregate annual data for all 309 firms combined are analyzed.

Adjustments Illustrated

The 1973 income statement data for Chrysler Corporation, as reported, as adjusted for straight-line depreciation, and as restated for general price-level changes is used to illustrate the effects of the adjustments as calculated in this study. Table 1 presents these data. The key variables or data items are accompanied by the variable notation that is used throughout this study.

Column 1 gives the income statement data as reported by Chrysler. Column 3 gives the adjusted or historic (nonrestated) data from which the

Table 1

ILLUSTRATION OF GPL PROFIT ADJUSTMENTS, CHRYSLER CORPORATION, 1973
(in millions of dollars)

	Reported (1)	Historic Adjustment Income Effect (2)	Adjusted or Historic (3)	Restated Adjustment Income Effect (4)	Restated (5)
Revenues	11,774		11,774	+531	12,305
Less:					
Misc. Expenses	485		485	- 22	507
Income Adjustment	(8) IA		(8) IA	- 0	(8)
Net Revenues	11,297		11,297	+ 509	11,806
Less:					
Cost of Goods Sold	10,636 CGS		10,636 CGS	-610 RGSA	11,246 RCG
Depreciation	180 DEP	-25 HDEPA	205 HCDEP	- 77 RDEPA	282 RDEP
Earnings Before Interest and Taxes	481 EBIT	-25	456 HEBIT	-178	278 REBIT
Less:					
Interest	32		32	- 2	34
Preferred Dividends	0		0	0	0
Earnings Before Taxes	449 EBT	-25	424 HEBT	-180	244 REBT
Less: Taxes	194		194	- 8	202
Earnings After Taxes	255 EAT	-25	230 HEAT	-188	42 REAT
Less: Dividends	69 DIV		69 DIV	- 3	72 RDIV
Earnings Retained	186 ER	-25	161 HER	-191	(30) RER
Earnings After Taxes	255 EAT		230 HEAT	-188	42 REAT
Monetary Losses / Borrowing Gains \ Stockholder Net Borrowing Gains				-110 ML / +238 BG \ SNBG	
Earnings After Taxes With Monetary Items				- 60	170 REATM

NOTE: Next to key variables are their variable notations. These are the variables as described in the Appendix on Variable Definitions and Calculations.

effects of GPL adjustments are calculated. The only difference between these nonrestated measures is the adjustment for straight-line depreciation of $25 million (HDEPA). The straight-line adjustment changes all profit measures and, therefore, they are all relabeled with an "H" preceding them, e.g., EAT (earnings after taxes) becomes HEAT.

Column 4 gives the effects on income of the general price-level adjustments. The three most frequently discussed adjustments are: (1) a $610 million income reduction for the restated cost-of-goods-sold adjustment (RGSA); (2) a $77 million income reduction for the restated depreciation adjustment (RDEPA); and (3) the $128 million income increase from monetary gains, labeled in this study as stockholder net borrowing gains (SNBG). Together these total to a net reduction of $559 million in profits. The bottom line of column 4, however, shows a total income reduction of only $60 million. The effect of restating all other items (principally, revenues) to end-of-year dollars from essentially average-of-year dollars is to increase income by $499 million.

For purposes of analysis, the general price-level adjustments could be separated into two procedural or computational steps. The first and most fundamental step is to restate all items into the same purchasing power units. Because, for practical purposes, most income statement items are originally stated in average-of-year dollars, the first step could be to restate those items which are not (i.e., depreciation and cost of goods sold) into average-of-year dollars. During periods of inflation, these adjustments will always increase these expenses and, therefore, will reduce income. For Chrysler, these adjustments would have been $131 and $68 million for cost of goods sold and depreciation, respectively.

Having restated all items into dollars of the same purchasing power (average-of-year dollars), the primary purpose of GPL adjustments has been accomplished. Net income can now be properly calculated by adding and subtracting these items because we are no longer dealing with apples and oranges.

The second step may be thought of as restating all data items into end-of-year dollars. The total effect on income from this step can be computed directly by multiplying income from step one by the ratio of the end-of-year to average-of-year dollars. For Chrysler, this amounts to approximately a $21 million increase in income. During inflation, this adjustment will always increase net income, assuming some existed after step one; otherwise, this adjustment will increase the net loss.

It is possible that the increase in the income measure by going from average- to end-of-year dollars (step 2) could be larger than the reduction in income from the adjustments for cost of goods sold and depreciation (step 1). Consequently, it is possible that restated net income could be higher than nonrestated net income during a period of rapid inflation. The point is that direct comparisons between reported data and GPL-adjusted data may be inappropriate unless either reported data are converted to end-of-year dollars, or, as might be more appropriate, GPL-adjusted data are converted to average-of-year dollars.

Column 5 of Table 1 presents the restated items as would be shown in the financial statements. Again, each of the key restated variables is accompanied by its variable notation--all of which are preceded by an "R."

In the analysis that follows, the effects of GPL adjustments are frequently measured by a comparison of column 3 and column 5 results. Although

this is the usual procedure, the reader is cautioned of the incomparability of these two columns and reminded of the effects of comparing year-end dollar figures with essentially average-of-year dollar figures.

Effects on Twenty Firms

Next we compare various financial measures for twenty of the Dow-Jones thirty industrial firms.

Comparison to other results

Table 2 gives ratios of restated to nonrestated income measures for each of these large firms for 1973. The data calculated in this study using the Winn methodology are compared to similarly calculated data reported elsewhere by Davidson and Weil (D&W) and by Falkenstein.[1/]

The first two columns compare my results of the ratio of REAT to HEAT with D&W results of the ratio of restated income after taxes to reported income after taxes. It is clear that there is a very close correlation between the alternative results for each of the firms. For the twenty firms, the mean and median ratio of restated to nonrestated income for both procedures are very close, though the Winn restated measures are somewhat higher. No doubt this occurs, in part, because Winn restates to December 31, 1973, dollars and Davidson and Weil restate to November 15, 1973, dollars.[2/]

[1/] Falkenstein's results were reported in Business Week, September 14, 1974, p. 96. Davidson & Weil's results were cited earlier.

[2/] If data are restated to "year-end" dollars by using the fourth quarter's deflator, essentially the restatement is to the middle of the fourth quarter or about November 15. In my method, I restate to December 31 dollars calculated by finding the average of the 1973 fourth quarter and the 1974 first quarter index.

Table 2

COMPARISON OF 1973 INCOME AS PERCENTAGE OF NONRESTATED INCOME FROM THREE SEPARATE STUDIES, TWENTY FIRMS

Dow-Jones Firm	Restated Income Before Borrowing Gains/Nonrestated Income (in percentage)		Restated Income With Net Borrowing Gains/ Nonrestated Income (in percentage)			Income Restated Only For Depreciation/ Nonrestated Income (in percentage)	
	WINN (1)	DAVIDSON WEIL (2)	WINN (3)	DAVIDSON WEIL (4)	FALKENSTEIN (5)	WINN (6)	FALKENSTEIN (7)
Allied Chemical	41	32	69	62	70	44	49
Alcoa	52	35	115	103	88	43	35
American Can	27	32	71	83	87	58	60
Bethlehem Steel	41	35	67	86	75	33	47
Chrysler	18	17	74	81	91	66	61
Esmark	51	34	78	72	52	87	68
Exxon	86	82	92	97	99	86	93
General Electric	91	84	119	106	90	83	83
General Foods	69	71	95	102	110	85	88
General Motors	74	68	76	71	64	85	86
Goodyear	49	52	95	95	101	70	65
International Harvester	-41*	10	46	65	111	65	70
International Nickel	88	80	100	105	102	94	87
International Paper	79	70	100	85	89	72	72
Johns-Manville	85	84	94	98	84	77	77
Procter and Gamble	90	87	93	96	96	93	95
Texaco	86	83	94	100	66	86	59
Union Carbide	73	63	91	82	79	65	64
U.S. Steel	24	29	69	68	62	35	33
Westinghouse Electric	81	76	118	112	96	72	71
Twenty Firm Mean	58	56	88	88	86	70	68
Twenty Firm Median	69-73	63-68	92-93	86-92	88-89	72	68-70

* The large negative ratio for Winn and the small positive ratio for D&W are consistent because it is apparent that book income in 1973 must be unusually low such that the adjustment compared to book income is unusually large. For D&W, the adjustment reduces restated income to only 10 percent of that reported, but for Winn the adjustment results in a net loss.

SOURCES: Sidney Davidson and Roman L. Weil, "Inflation Accounting," Financial Analysts Journal, January-February 1975, Table 1; also William G. Shepherd, "Financial Statements Gone Awry," Business Week, September 14, 1974, p. 96.

The next three columns (3-5) present the ratio of restated income including monetary gains or losses to nonrestated income. Again, the correlation between the Winn and D&W measures is very high, and the mean and median for all twenty firms is identical. The Falkenstein measures are also highly correlated with the Winn and D&W measures, though they produce the lowest pair-wise correlation results. The final two columns (6-7) compare the Falkenstein and Winn ratios of income restated only for depreciation to nonrestated income. Again, the results are very similar with a few exceptions, e.g., Esmark, Texaco, Alcoa, and Bethlehem Steel. Given the substantial difference in methodology, the similarity of these results adds credibility to both methods.

In summary, Table 2 affirms that the methodology employed in this study produces results, on the average, that are similar to results obtained by others for a few firms, for 1973, and which use much less complicated methodologies. (For a discussion of the more substantive implications of the results Table 2 gives for these twenty firms plus ten more, see Davidson and Weil's analysis in the Financial Analysts Journal.)

Comparison of 1969-73 financial measures

The use of profit ratios to assess the impact of GPL adjustments (as reported in Table 2) ignores the effects on the balance sheet, and is as relevant as a comparison of absolute profit measures for different sized firms to determine how well a firm is doing. It is for this reason that rates of return are used for inter-firm and inter-temporal comparisons. Though a firm's profit measure may be little affected by GPL adjustments, it is quite possible that, because of effects on the balance sheet, rates of return may be significantly affected.

Table 3 compares 1969-1973 period-average rates of return and debt-equity ratios for the same twenty Dow-Jones firms. For this five-year period, these firms had an average nonrestated, after-tax return (HSRA) on stockholder's equity (column 1) of 9.4 percent. Restated for GPL adjustments but not including monetary gains and losses, the average rate of return fell to 4.5 percent (column 2). The percentage point adjustments to the rates of return (the absolute differences between these measures) are given in column 3. Chrysler had the largest adjustment of 8 percentage points with Johns-Manville and Bethlehem Steel the smallest at 3 points.

Column 4 gives the return percentage point adjustment by including stockholder net borrowing gains (gains and losses on monetary items). For these twenty firms, the inclusion of net borrowing gains increased returns by 1.2 percentage points on the average. In other words, restated returns without monetary gains averaged 4.5 percent and with monetary gains included averaged 5.7 percent. The only firm with net borrowing losses (a net monetary asset position) was Johns-Manville with a reduction in returns of 0.2 percentage points. The reason, most likely, is their very low use of debt as indicated by their debt-equity ratios in columns 5 and 6. Chrysler, at the other extreme, having the highest debt-equity ratio, benefitted the most from monetary items by increasing their returns by 3.1 percentage points. Clearly, debt-equity ratios are highly correlated with net borrowing gains ($r = .89$ for these twenty firms). For these twenty firms it is also true that the more profitable firms (RSRA) have lower net borrowing gains ($r = -.65$).

Columns 5 and 6 give nonrestated and restated debt-equity ratios, respectively. On the average, nonrestated debt-equity ratios are 38 percent

Table 3

COMPARISON OF 1969-1973 PERIOD-AVERAGE FINANCIAL MEASURES FOR TWENTY FIRMS

Dow-Jones Firm	Nonrestated Adjusted Returns (in percentage) (HSRA) (1)	Restated Returns Before Borrowing Gains (in percentage) (RSRA) (2)	Rate of Return Percentage Point Adjustment: Before Monetary Gains (HSRA-RSRA) (3)	Rate of Return Percentage Point Adjustment: Net Gains Borrowing (RSRAM-RSRA) (4)	Debt-Equity Ratios (in percentage): Nonrestated Debt HCE (5)	Debt-Equity Ratios (in percentage): Restated Debt RCE (6)
Allied Chemical	6.0	1.4	4.6	1.2	63	45
Alcoa	8.5	2.7	5.8	2.3	113	65
American Can	7.6	2.4	5.2	1.7	82	59
Bethlehem Steel	3.8	0.8	3.0	0.7	46	31
Chrysler	6.3	-1.7	8.0	3.1	133	101
Esmark	7.9	0.4	7.5	1.4	85	59
Exxon	15.5	9.6	5.3	0.6	59	45
General Electric	12.3	8.1	5.2	1.8	107	79
General Foods	13.0	8.1	4.9	0.7	78	63
General Motors	15.1	9.2	5.9	0.2	48	39
Goodyear	9.7	4.4	5.3	1.8	93	73
International Harvester	3.9	-1.7	5.6	2.3	97	80
International Nickel	12.3	7.7	4.6	0.7	46	33
International Paper	7.7	3.6	4.1	1.2	63	43
Johns-Manville	8.2	5.2	3.0	-0.2	29	21
Procter and Gamble	16.6	12.3	4.3	0.1	39	32
Texaco	15.0	9.3	5.7	0.6	48	35
Union Carbide	7.5	3.5	4.0	1.0	61	43
U.S. Steel	3.1	0.0	3.1	1.1	54	33
Westinghouse Electric	8.5	5.1	3.4	0.7	96	70
Twenty Firm Mean	9.4	4.5	4.9	1.2	72	52

higher than GPL restated debt-equity ratios. For some firms (i.e., Alcoa) the overstatement is very high while for others (i.e., Procter and Gamble) the overstatement is low.

Before moving to the industry and aggregate analysis, several additional observations about the effects of GPL adjustments on firm data should be given. First, it should be pointed out that there exists little a priori reason to expect that the size of the percentage point adjustment in rates of return (HSRA-RSRA) from adjusting depreciation and cost of goods sold should be correlated with the level of the returns. (In fact, for these twenty firms r is only .18.) Second, as would be expected, for those eight firms which predominately use a LIFO inventory valuation method, the adjustments to restated returns are smaller. This is true even though the effects of restating the balance sheet would be to increase the rate of return adjustment. The restatement of inventories increases common equity measures (and therefore reduces return measures) more when LIFO is used than if FIFO is used.

Table 4 presents the effects of GPL adjustments on firms categorized as above- and below-average for four different characteristics. These results may be highlighted as follows: Firms whose rates of return are reduced the greatest (where HSRA-RSRA is the highest) are high-growth firms with low capital-output ratios and high debt-equity ratios. Firms whose rates of return benefit the most by the inclusion of net borrowing gains are highly leveraged, high-growth firms. Firms earning well-below the average restated after-tax returns (RSRA) of 4.7 percent were the capital-intensive, low growth firms. In addition, firms with high debt-equity ratios earned a very low return before the inclusion of net borrowing

Table 4

COMPARISON OF RATES OF RETURN BY FOUR KEY VARIABLE CHARACTERISTICS
309 CORPORATIONS, 1969-1973 PERIOD AVERAGES

Key Variable Category	Number of Firms	Key Variable Mean (total assets in $ millions, all others in percentage)	Rates of Return (in percentage)		Rate of Return Percentage Point Adjustments	
			HSRA	RSRA	Before Monetary Gains (HSRA-RSRA)	Net Borrowing Gains (RSRAM-RSRA)
	(1)	(2)	(3)	(4)	(5)	(6)
All Firms	309		9.9	4.7	5.2	1.8
Asset-Sales Ratio		84.7				
Low	185	60.2	11.6	6.0	5.6	1.6
High	124	121.3	7.5	2.9	4.6	1.9
Total Assets		741				
Small	235	254	10.2	5.0	5.2	1.6
Large	74	2,284	9.0	4.0	5.0	1.9
Asset Growth Rate		11.7				
Low	174	7.7	8.1	3.4	4.7	1.3
High	135	16.8	12.2	6.4	5.8	2.4
Debt-Equity Ratio		86.1				
Low	196	54.8	10.7	6.2	4.5	0.7
High	113	140.5	8.5	2.1	6.4	3.6

gains. The inclusion of net borrowing gains, therefore, tends to reduce the variation of returns among the firms.

Effects on Fifteen Industries

For this section, the effects of 1969-73 GPL adjustments for fifteen arbitrarily selected industries (99 firms) are compared. Table 5 shows that these industries earned a period-average, nonrestated return (HSRA) of 11.7 percent compared to a restated return (RSRA) of 6.5 percent. These returns were higher than the 309-firm averages of 9.9 percent and 4.7 percent, respectively.

The effects of GPL adjustments on rates of return are quite varied, interesting, and sometimes, perhaps, unexpected. For example, the most profitable industries of drugs and soft drinks were among the least affected by GPL adjustments, before the inclusion of borrowing gains. Furthermore, for only drugs and soft drinks were monetary losses incurred because of a net monetary asset position (column 5).

The absolute percentage point adjustments to returns, before borrowing gains (HSRA-RSRA), ranged from a high of 7.4 percentage points, for retail food chains, to a low of 3.3 percentage points for steel. One might have expected that steel, with its high capital intensity and long-lived fixed assets, and the food chains, with their high inventory turnover, would have been affected in the reverse pattern. This contrast, therefore, underscores the importance of the cost of goods sold adjustment, profit margins, and the inventory valuation method. The low adjustment effect for steel has, in part, resulted because all firms use LIFO. The high adjustment in retail results because even a small percentage increase in

Table 5

COMPARISON OF RATES OF RETURN FOR FIFTEEN INDUSTRIES (99 FIRMS), 1969-1973 PERIOD AVERAGES

Industry	Number of Firms	Rates of Return (in percentage)		Rate of Return Percentage Point Adjustment		Debt-Equity Ratios (in percentage)	
		(HSRA)	(RSRA)	Before Monetary Gains (HSRA-RSRA)	With Net Borrowing Gains (RSRAM-RSRA)	Nonrestated Debt HCE	Restated Debt RCE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
All Firms	309	9.9	4.7	5.2	1.8	98	73
Paper	8	7.5	3.1	4.4	1.6	76	52
Autos	3	11.4	4.7	6.7	1.7	86	67
Drugs	8	22.1	17.4	4.7	-0.4	58	49
Food (packaged)	7	14.1	8.4	5.7	2.2	100	78
Textiles	9	5.3	0.1	5.2	1.5	93	74
Steel	6	4.3	1.0	3.3	1.1	59	38
Industrial Mach.	6	13.6	8.3	5.3	0.3	56	47
Construction Mach.	4	12.3	6.1	6.2	2.5	107	83
Soft Drinks	4	21.7	16.9	4.8	-0.1	53	43
Cement	8	7.1	2.5	4.6	1.3	64	42
Petroleum	12	11.2	6.4	4.8	1.3	60	44
Chemicals-Major	8	9.8	4.8	4.8	1.3	72	55
Copper	3	11.4	6.9	4.5	0.7	39	28
Retail-Department	6	11.1	5.8	5.3	1.7	114	81
Retail-Food Chain	7	13.2	5.8	7.4	3.1	101	79
Fifteen Industry Average (99 Firms)		11.7	6.5	5.2	1.3	76	57

cost of goods sold in a low margin but rapid turnover business can produce a very substantial effect on rates of return.

Finally, columns 6 and 7 give the nonrestated and restated debt-equity ratios. On the average non-restated ratios are one-third higher than restated debt-equity ratios because of the understatement of equity.

The ratio of restated to nonrestated debt-equity ratios vary from industry to industry. For example, compare steel with industrial machinery. Steel is indicated to have a higher nonrestated debt-equity ratio (59 percent vs. 56 percent for machinery). By restating equity, however, industrial machinery is indicated to have a considerably higher ratio (47 percent vs. 38 percent).

Comparison of Annual Aggregate Measures

In this section five tables present annual data for the 309 firms taken as a whole. These and similar data are used in shaping and evaluating public policy actions such as price-controls, fiscal and monetary policy, tax policies toward business, or policies toward energy. It is these aggregate data that should be highly correlated with the movement of general business conditions--economic growth, unemployment, and inflation.

Current dollar profit measures

The analysis begins in Table 6 with a comparison and summary of various current-dollar profit measures. The first three columns of the table are reported aggregate measures of earnings before taxes (EBT), income taxes, and earnings after taxes (EAT). Generally, these data indicate that corporate profits remained roughly level, without any trend,

Table 6

COMPARISON OF ABSOLUTE PROFIT MEASURES* FOR 309 FIRMS, 1964-1973
(Millions of Current Dollars)

					END OF CURRENT-YEAR DOLLARS				
	EBT (1)	Taxes (2)	EAT (3)	HEAT (4)	HEAT (5)	Restatement Adjustment (6)	REAT (7)	Net Borrowing Gains (8)	REATM (9)
1964	$ 20,668	$ 8,996	$ 11,672	$ 12,003	$ 12,124	$ 1,348	$ 10,776	$ 172	$ 10,948
1965	24,164	10,502	13,662	14,076	14,209	1,480	12,729	252	12,981
1966	25,398	10,928	14,470	14,878	15,126	1,843	13,283	691	13,974
1967	23,577	9,956	13,621	13,921	14,193	2,504	11,689	985	12,674
1968	27,693	12,524	15,169	15,040	15,366	3,079	12,287	1,493	13,780
1969	27,624	12,577	15,047	14,737	15,162	3,932	11,230	2,428	13,658
1970	23,208	10,216	12,992	12,803	13,134	5,208	7,926	2,738	10,664
1971	28,386	13,040	15,346	14,868	15,105	5,312	9,793	2,082	11,875
1972	33,749	15,900	17,849	17,526	17,874	6,142	11,732	2,157	13,889
1973	43,881	20,690	23,191	23,065	24,104	8,400	15,704	4,914	20,618
TOTAL	$278,348	$125,329	$153,019	$152,917	$156,397	$ 39,248	$117,149	$ 17,912	$135,061

* The profit measures are reported earnings before taxes (EBT), earnings after taxes, earnings after taxes adjusted for straight-line depreciation (HEAT), GPL restated earnings after taxes before monetary items (REAT) and restated earnings with monetary items included (REATM). For details see Appendix on Variable Definitions and Calculations.

during the 1964-1970 period. They then climbed rapidly during the 1970-1973 period to levels double the 1964 level. The fourth column is the adjusted (nonrestated) profit measure (HEAT) that results from the assumptions of a straight-line depreciation policy and the other methodological procedures used in this study. These measures are quite close to reported measures which is important because the adjusted measures are used as the bases for determining the effects of the GPL adjustments.

In column 5, HEAT is "scaled" to end-of-year dollars by treating HEAT in column 4 as if it were stated in average-of-year dollars. As discussed in the Chrysler example, the differences between restated and nonrestated data result because: (1) costs of goods sold and depreciation costs are adjusted to dollars of constant purchasing power, and because (2) all revenues and expenses are restated to end-of-year dollars to arrive at an end-of-year dollar income which is compared to nonrestated income essentially expressed in average-of-year dollars. By comparing data in end-of-year dollars, the "restatement adjustment" in column 6 gives only the effects on income (in year-end dollars) for the costs of goods sold and depreciation adjustment.

In the years of 1964 and 1965, the GPL adjustments for cost of goods sold and depreciation averaged about 11 percent of nonrestated income. These adjustments increased over the years, in absolute and relative terms, until 1970 when the adjustments represented 40 percent of nonrestated income. From there until 1973, the adjustments continued to increase in absolute terms, but in relative terms they remained constant at about one-third of book income. As a result of higher inflation and the larger adjustments, aggregate restated income for these 309 firms is indicated to

have increased only 50 percent from 1964 to 1973 instead of the 100 percent increase indicated by the nonrestated measures (column 4).

Column 8 gives aggregate net borrowing gains for these firms. While they represented only 1.5 percent of income in 1964-1965, they represented better than 20 percent of nonrestated income in 1970 and 1973. As a consequence, restated income, including net borrowing gains such as reported income, has nearly doubled in 1973 from the 1964 levels.

Current-cost and GPL adjustments

Aggregate data for all nonfinancial corporations are available for these years from the Department of Commerce. Recall the earlier arguments in this paper that when data are aggregated across all economic units, GPL-adjusted profits (before the inclusion of net borrowing gains) should approximate current-cost operating profits. In theory GPL adjustments should eliminate all holding gains from aggregated data.

Table 7, column 1, presents before-tax, nonrestated profit measures for each of the ten years for all nonfinancial corporations. These profit measures are adjusted by the Department of Commerce to reflect a straight-line depreciation policy.[1/] Column 2 gives similar measures for the 309 firms in this study. Both nonrestated measures for each year are "scaled" to 1973 dollars by multiplying each year's nonrestated profits by the ratio of the 1973 GNP implicit deflator to each year's deflator. Although this procedure is incorrect, it does allow a better comparison of the

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[1/] The current-cost data, based on commerce data, are taken from Daryl Winn, "The Effect of Alternative Accounting Measures on Public Policy and Resource Allocation," unpublished manuscript.

Table 7

COMPARISON OF CURRENT-COST WITH GENERAL PRICE-LEVEL ADJUSTMENTS, 1964-1973

	Nonrestated Before Tax (After Interest) Profits (in billions of 1973 dollars)		Col 2 ÷ Col 1 (in percentage)	Nonrestated Minus Restated As A Percentage of Nonrestated Profits	
	All U.S. Firms* (1)	309 Firms (2)	(3)	Current-Costs* (4)	GPL (5)
1964	85.9	31.1	36.2	6.8	6.4
1965	98.8	35.8	36.2	7.4	6.0
1966	103.7	36.5	35.2	7.5	7.1
1967	93.9	32.8	34.9	8.1	10.5
1968	98.4	36.3	36.9	11.5	11.2
1969	90.0	34.3	38.1	16.2	14.4
1970	71.7	27.4	38.2	22.5	22.7
1971	78.2	31.8	40.7	22.4	19.0
1972	87.8	36.9	42.0	23.0	18.4
1973	106.4	43.8	41.0	30.0	19.2
TOTAL	914.8	346.7	37.9	15.5	13.5

* All nonfinancial corporations, domestic operations. These data are taken from Allan H. Young, "Alternative Estimates of Corporate Depreciation and Profits: Part II," Survey of Current Business, May 1968, pp. 16-28, and "Alternative Estimates of Corporate Depreciation and Profits, 1965-1973," Survey of Current Business, May 1974, pp. 19-21.

movement over time in the two totals without affecting any of the ratios calculated in columns 3-5. Columns 1 and 2 show that "constant" dollar profits were relatively flat until 1969 when they fell sharply. From 1969, they recovered to reach new highs in 1973.

Column 3 gives the percentage that the 309 firm profits are of total nonfinancial corporate profits. Surprisingly enough, for this period, these 309 firms account for 38 percent of total nonfinancial corporate profits. During the first five years from 1964 to 1968, this nonfinancial profit was fairly constant at 36 percent. In the last five years, however, the percentage of profits accounted for by these 309 firms had increased to over 40 percent. This indicates that these 309 firms have experienced above-average profitability growth.

The last two columns give the comparison of the effects of current-cost and general price-level adjustments. This is achieved by comparing the adjustments (absolute differences between restated and nonrestated measures) as a percentage of the respective nonrestated profit measures. It is clear that these adjustment percentages moved very closely to one another during 1964-1970. Beginning in 1971, however, they diverge as the current-cost adjustments continue to rise while the GPL adjustments fall in 1971 and then remain constant.

The reasons for this divergence are not clear. However, we would argue that the reasons are related to the differences in the composition of the two samples (ours includes no utilities and is probably biased towards basic material and heavy industry), rather than to the conceptual differences between GPL and current-cost adjustments. In short, while the GNP implicit deflator may represent the weighted-average movement of all

input and output prices for the economy, or nonfinancial corporations as a whole, it may be ill-suited for this 309-firm sample for these years.[1/]

Constant-dollar comparative analysis

One of the major criticisms of conventional accounting is that each year's profit measures are misstated because costs are recorded in dollar units of different purchasing power. General price-level or current-cost adjustments attempt to correct this deficiency. Another criticism not as frequently voiced, yet potentially as important, is that profit data, though correctly stated for each year, should not be compared to data of another year unless all data are restated to dollars of the same purchasing power. In other words, when profit data are presented in a historical summary or when year-to-year changes rather than absolute levels are important, the process of converting all, say 1964 or 1972, revenues and expenses into 1964 or 1972 end-of-year dollars may be overshadowed in importance by the conversion of 1964, 1972, and all other year profit measures, whether adjusted or not, into 1973 (or the latest years') dollars. The reason is simply that in economic analysis year-to-year changes, which are affected when all years are restated to a single year's units, may be more important than the absolute level of profits in any one year.

Table 8 gives nonrestated and restated data in both current and constant 1973 dollars to illustrate these points. The first three columns give nonrestated earnings after taxes and earnings retained (HEAT and HER)

[1/] This period is unusual because some price increases were unusually large, yet general indices and some components were held down because of the timing and other effects of recession and wage-price controls. For example, from 1970 to 1973, the GNP deflator increased 16 percent, the wholesale price index increased 22 percent, and the wholesale price index for "crude materials for further processing" increased 55 percent.

Table 8

COMPARISON OF CURRENT AND CONSTANT DOLLAR PROFIT MEASURES, 309 FIRMS, 1964-1973
(millions of dollars)

	CURRENT DOLLARS			RESTATED IN 1973 CONSTANT DOLLARS				
	Nonrestated*							
	Earnings After Taxes (HEAT)	Earnings Retained (HER)	Restated Earnings Retained (RER)	Earnings Before Taxes (REBT)	Taxes (RTAX)	Earnings After Taxes (REAT)	Common Dividends (RDIV)	Earnings Retained (RER)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1964	12,003	5,763	4,472	29,144	13,333	15,811	9,249	6,562
1965	14,076	7,097	5,684	33,605	15,269	18,336	10,149	8,187
1966	14,878	7,576	5,859	33,967	15,471	18,496	10,337	8,159
1967	13,921	6,381	4,002	29,370	13,650	15,720	10,338	5,382
1968	15,040	6,998	4,070	32,369	16,512	15,857	10,605	5,252
1969	14,737	6,372	2,624	29,548	15,819	13,729	10,521	3,208
1970	12,803	4,634	-455	21,399	12,184	9,215	9,744	-529
1971	14,868	6,720	1,515	25,975	14,982	10,993	9,292	1,701
1972	17,526	8,999	3,036	30,244	17,547	12,697	9,411	3,286
1973	23,065	13,704	5,922	37,324	21,620	15,704	9,782	5,922
TOTAL	152,917	74,244	36,729	302,945	156,387	146,558	99,428	47,130

* Nonrestated variables are reported measures adjusted to reflect straight-line depreciation.

as well as restated earnings retained (RER) for each of the ten years in current dollars. Columns 1 and 2 are data as would be presented in the conventional statistical or historical summary section of the annual report.

Columns 4-8 in Table 8 give restated data in constant 1973 dollars. Instead of presenting columns 1 and 2, the historical summary should present columns 6 and 8. If this were done, the conclusion (based on columns 1 and 2) that profits and earnings retention remained flat from 1964 through 1971 and then doubled in 1973, instead should be (based on columns 6 and 8) that profits fell during the 1964-71 period and in 1973 almost recovered to the 1964 level. In real terms, the profits earned and retained by these 309 large firms in the 1973 "record" year were less than those earned ten years earlier on one-half of the investment.

Several other important observations should be made based on the data contained in Table 8. The effect of GPL adjustments on earnings retention by these 309 firms for the entire ten-year period is to halve the amount of funds available to the firm. In 1970, for these 309 firms taken as a whole, the GPL-adjusted data indicate that dividends paid were approximately one-half billion dollars in excess of aggregate earnings even though aggregate dividends (restated to 1973 constant dollars) showed a remarkably stable, no-growth, pattern for these ten years.

Rates of return and effective tax rates

The constant (1973) dollar, absolute profit data in Table 8 indicate that the profitability for the 309 firms deteriorated substantially over the ten-year period, and though they increased in 1973, these "record"

profits were slightly lower than those earned in 1964, ten years earlier. Because assets and equity have increased rapidly, rates of return have suffered even greater deterioration. Table 9 gives the various after-tax rate-of-return measures for stockholders' equity, as well as effective tax rates.

The first two columns present nonrestated rates of return. Actual returns (SRA) averaged 12.4 percent for the ten-year period. The returns of 11.0 percent for the 1969-73 period were somewhat below the 13.7 percent returns earned during the first five-year period. Estimated adjusted returns (HSRA) averaged approximately one percentage point lower for the ten-year period. Recall that the differences between the reported and the adjusted return measures (because of differences in depreciation and net depreciable asset figures) result from our procedures to estimate average age and useful life, and the assumption of a straight-line depreciation policy. The major reason for the discrepancy in returns, apparently, is not with depreciation and, therefore, profits, but it is with the estimate of net fixed assets which causes a larger stockholder equity figure.

The lower adjusted returns, therefore, appear to have resulted from the conservative procedures and assumptions (FIFO) in estimating average age. Although the distortion bias in the GPL adjustments ought to be minimal between firms and industries (because we control for the estimating procedures by comparing similarly computed variables), the estimates (too low) of average age will systematically understate the effects of GPL adjustments for all firms. The reason, obviously, is that if average age is systematically understated, then the procedures treat the assets as having been acquired more recently than they actually were acquired. The

Table 9

COMPARISON OF RATES OF RETURNS AND EFFECTIVE TAX RATES FOR 309 FIRMS, 1964-1973

	After-Tax Stockholder Returns (in percentage)				Rate of Return Percentage Point Adjustments		Effective Tax Rates (in percentage)	
	Reported (SRA)	Adjusted Non-restated (HSRA)	Restated Before Monetary Gains (RSRA)	Restated With Monetary Gains (RSRAM)	Before Net Borrowing Gains (HSRA-RSRA)	Net Borrowing Gains (RSRAM-RSRA)	Non-restated (TAXES/HEBT)	Restated (RTAXES/REBT)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1964	12.9	12.2	9.9	10.2	2.3	0.3	42.8	45.7
1965	14.3	13.4	10.7	11.0	2.7	0.3	42.7	45.4
1966	15.0	14.0	10.7	11.5	3.3	0.8	42.3	45.5
1967	13.4	12.5	9.0	10.0	3.5	1.0	41.7	46.5
1968	12.8	11.8	7.8	9.2	4.0	1.4	45.4	51.0
1969	12.2	11.0	6.4	8.3	4.6	1.9	46.0	53.5
1970	9.6	8.6	3.9	5.8	4.7	1.9	44.4	56.9
1971	9.8	8.7	3.9	5.1	4.8	1.2	46.7	57.9
1972	10.9	9.8	4.6	5.8	5.2	1.2	47.6	58.0
1973	12.5	11.4	4.8	7.4	6.6	2.6	47.3	57.9
PERIOD AVERAGES								
1964-73	12.4	11.4	7.2	8.4	4.2	1.3	44.7	51.8
1964-68	13.7	12.8	9.6	10.4	3.2	0.8	43.0	46.8
1969-73	11.0	9.9	4.7	6.5	5.2	1.8	46.4	56.8

result is that the restated depreciable asset amounts are below those that should result.

Columns 3 and 4 give after-tax restated returns. Returns, excluding net borrowing gains, averaged 9.6 percent during 1964 to 1968 but fell by more than half to only 4.7 percent during 1969 to 1973. Recalling that book returns had fallen only from 13.7 percent to 11.0 percent between these periods, it is clear that in the more recent years inflation has led to large restatement adjustments. For example, in 1973 nonrestated returns of 11.4 percent were nearly two and one-half times the restated returns of 4.8 percent.

The deterioration in rates of return is not as pronounced when net borrowing gains are included. These returns (RSRAM) averaged 10.4 percent and 6.5 percent for the two five-year periods, respectively. The 1973 restated returns were improved considerably from 4.8 percent to 7.4 percent because the inclusion of net borrowing gains added 2.6 percentage points.

Columns 5 and 6 give the percentage point differences between "book" returns (HSRA) and the two restated return measures. The effect of GPL adjustments, before the inclusion of monetary items, monotonically increases every year during the ten-year period. On the other hand, the percentage point contribution of net borrowing gains fluctuates from year-to-year largely depending on the rate of inflation. It is important to note, however, that the inclusion of monetary gains and losses has a very significant impact on rates of return. During the 1969-1973 period, the inclusion increased restated returns from 4.7 percent to 6.5 percent, i.e., net borrowing gains accounted for better than one-quarter of these fully restated profit rates.

The final two columns give the effective tax rates calculated as the ratio of taxes to nonrestated (HEBT) and restated (REBT) earnings before taxes (and before net borrowing gains). For convenience, we will label the nonrestated and restated tax rates as nominal and real tax rates, respectively. In the 1964-1968 period, real tax rates averaged 3.8 percentage points higher than nominal rates (46.8 percent versus 43.0 percent). In 1969-1973, nominal rates increased (1968 surcharge, repeal of investment credit) by 3.4 points to an effective rate of 46.4 percent while real rates increased by 10.0 points to an effective rate of 56.8 percent. In a sense, the legislated increase in tax rates of 3.4 points represented only one-third of the increased burden on corporations. Inflation increased tax rates by 6.4 points or the other two-thirds. Had the 1973 nominal effective tax rate of 47.3 percent been applied to the 1973 restated earnings (before borrowing gains) instead of the book earnings, the 309 corporations would have retained another $4.6 billion in 1973--a 78 percent increase.

Comparison of Financial Market Measures

Table 10 presents some relevant financial market variables. Though it is tempting to suggest some cause-and-effect relations between firm performance and financial health measures, and performance in the stock market, it is most difficult without statistical analysis. Nevertheless, these data are of interest in and of themselves, and can be used to summarize the findings and importance of this study.

It has been well established that the inflation-adjusted profitability of these 309 firms has deteriorated during this ten-year period. The movement in the aggregate (1973 constant dollar) market value of these firms'

Table 10

COMPARISON OF FINANCIAL MARKET PERFORMANCE MEASURES

	Common Stock Market Value (billions of 1973 $)	Price-Earnings Ratios		Dividend-Payout Ratios (in percentage)		Debt-Equity Ratios (in percentage)		Capital Expenditure Coverage Ratios	
	MKTVAL (1)	MKTVAL/ HEAT (2)	MKTVAL/ REAT (3)	DIV/ HEAT (4)	RDIV/ REAT (5)	DEBT/ HCE (6)	DEBT/ RCE (7)	HCECOV (8)	RCECOV (9)
1964	367.1	20.6	23.0	52.0	58.5	64.4	56.6	1.47	1.41
1965	383.7	18.8	20.7	49.6	55.3	66.3	58.6	1.25	1.17
1966	297.0	13.3	14.8	49.1	55.9	72.7	63.2	1.15	1.00
1967	339.7	17.8	21.2	54.2	65.8	79.1	67.4	1.14	1.01
1968	347.9	17.6	21.5	53.5	66.9	86.5	71.3	1.12	.98
1969	299.1	16.1	21.2	56.8	76.6	94.2	74.0	1.03	.85
1970	291.4	19.1	30.8	63.8	105.7	97.8	74.2	1.00	.77
1971	323.1	19.1	28.9	54.8	84.5	98.7	73.8	1.25	.94
1972	364.8	19.0	28.2	48.7	74.1	98.7	72.7	1.34	1.10
1973	288.7	12.0	17.6	40.6	62.3	103.0	70.8	1.27	1.01
PERIOD AVERAGES									
1964-73	330.3	17.3	22.8	52.3	70.6	86.1	68.3	1.20	1.02
1964-68	347.1	17.6	20.2	51.7	60.5	73.8	63.4	1.23	1.11
1969-73	313.4	17.1	25.3	52.9	80.6	98.5	73.1	1.18	.93

common stock (given in column 1 of Table 10) appears to reflect this deterioration.

The remaining eight columns in Table 10 give various nonrestated and restated financial measures. The price-earnings ratios in columns 2 and 3 present an interesting contrast. Whereas nonrestated price-earnings ratios fell from an average of 17.6 in the 1964-1968 period to an average of 17.1 in 1969-1973, restated price-earnings ratios show a large increase from 20.2 to 25.3. Dividend payout ratios provide another comparison. While nonrestated ratios remained constant at about 52 percent in each of the two five-year periods, restated ratios increased substantially from 60 percent in 1964-1968 to 80 percent in 1969-1973. In 1970, aggregate dividends exceeded aggregate earnings. To the extent that these aggregate GPL measures are similar to current-cost measures, we can conclude that these firms would have to have gone to the external capital markets in 1970 just to maintain productive capacity. Furthermore, with an average retention of only 20 percent as opposed to nearly a 50 percent book retention during the last five years, we might conclude that the ability to expand productive capacity has been seriously limited for these firms.

Columns 6 and 7 present the average debt-equity ratios for these 309 firms. In recent years, there has been a growing concern in the financial markets that the rapid and large increase in debt-equity ratios is putting the large corporations into an unhealthy financial situation. The data in column 6 supports this concern by indicating that debt-equity ratios have increased steadily from 64 percent in 1964 to 103 percent in 1973. However, it is clear from column 7, which presents restated debt-equity ratios, that the rise since 1968 has been illusory. Using equity

restated for inflation, debt-equity ratios in 1973 are below the 1968 ratios. The large increases in restated debt-equity ratios (from 57 percent to 71 percent) occurred long ago, between 1964 and 1968.

The last two columns give capital expenditure coverage ratios calculated as the ratio of earnings retained plus depreciation charges divided by capital expenditures. Column 8 gives the nonrestated measures. If the ratio is equal to unity (1), this implies that the internal generation of funds is just sufficient to meet the capital or physical asset expenditure requirements. If the ratio is greater than unity, funds are available to expand financial assets (working capital). Presumably, however, the inflation-adjusted measures provide a better indication of the adequacy of these cash flows (and capital expenditures) to replace used-up capacity or sold inventory.

During the two earliest years of the decade, the two measures moved fairly close together. In later years, the two measures diverged rather substantially. While the nonrestated ratio fell only slightly from 1.23 in the first five years to 1.18 in the last five years (never falling below unity in any year), the restated ratio fell from an average of 1.11 in the first period to .93 in the last period. The low point was reached at .77 in 1970. These restated data indicate that the 309 firms may have had greater difficulty in obtaining expansion capital than indicated by book data, especially during the late 1960s and early 1970s.

Summary of Results

Because the primary purpose of this study is to develop general price-level (GPL) restated financial data, the presentation has been more

descriptive than analytical. Some of the more interesting and important results are summarized here.

We find that the effects of GPL adjustments on the relative profit performance of firms varies considerably. In a sample of twenty of the Dow-Jones thirty industrials, the percentage point adjustments to rates of return on stockholders' equity ranged from a high of 8 points to a low of 3 points. This large range was produced because the range of effects of the adjustments on profits was large and the range of the effects on stockholders' equity was large. As a consequence of sometimes substantial, yet sometimes forgotten, effects on the balance sheet, the effect of GPL adjustments on debt-equity ratios varied considerably. For example, ALCOA's debt-equity ratio was reduced from 1.13 to .65 while Procter and Gamble's ratio was reduced only from .39 to .32.

The 309-firm, 1969-1973 average, nonrestated after-tax return on stockholders' equity of 9.9 percent was reduced to only 4.7 percent by GPL adjustments. When average monetary gains of 1.8 percentage points are included, restated returns are increased from 4.7 percent to 6.5 percent. For this time period of high inflation, it is clear that monetary gains are, on the average, important and material. In a sample of fifteen industries, monetary gains ranged from a high of a 3.1 percentage point rate of return increase in retail food chain stores to a low of a negative gain (loss) of -0.4 percentage points in drug manufacturing.

In the analysis of fifteen industries, it is also interesting that the retail food chain's returns are the most affected by GPL adjustments with returns of 13.2 percent being reduced to 5.8 percent (before the inclusion of monetary items). Though turnover is very rapid and the effect

on profit margins may be slight, the comparatively small margin adjustment becomes a very significant (high percentage) adjustment because margins are very low to begin with.

Comparing the 309-firm aggregate data for each of the ten years in the 1964-1973 period reveals some interesting conclusions. When profits are restated and expressed in 1973 constant dollars, we find that the "record" high profits of 1973 are lower than the profits earned in every year from 1964 through 1968. As a consequence of expressing data in 1973 dollars, the finding that the market value for these 309 firms was at a--1964-1973 period--record low in 1973 is easier to explain.

During 1969-1973, legislated or nominal effective tax rates averaged 3.4 percentage points higher than the rates for the 1964-1968 period. In contrast, the average real tax rates (based on GPL, constant dollar data) increased by 10.0 percentage points between the two periods. This implies that one-third of the increased tax burden in the last five years was legislated and two-thirds was a result of inflation.

In 1970, aggregate, constant 1973 dollar dividends of $9.7 billion exceeded aggregate GPL profits of $9.2 billion. On this basis, the one-half billion dollars in dividends represented a liquidation of the capital stock of these 309 firms--a return of capital that was taxed as personal income. Whereas nonrestated data indicates that debt-equity ratios rose throughout the entire ten-year period (from an average ratio in 1964 of .64 to 1.03 in 1973), restated debt-equity ratios show a far less dramatic rise from .57 to .71. In fact, restated debt-equity ratios have actually fallen during the last six years suggesting that the increased leverage, in recent years, may have been illusory.

In conclusion, the results of this study indicate that the effects of GPL adjustments on individual firms' income statements and balance sheet data vary substantially from firm to firm. The effects of GPL adjustments depend upon the rates of growth; the use of leverage; the degree of capital-intensity; the age, useful life, and importance of amortizable assets; the relative size, the turnover speed, and the costing method of inventory; and, finally, the movement of the price level itself.

General price-level-adjusted data are useful because they efficiently summarize the effects of the interplay between each firm's unique set of characteristics and inflation upon its financial performance. The conclusion that some firms' data are affected considerably while others are not is important, even if investor and management decisions are not significantly affected by GPL data, as some argue. We argue that public policy decisions might be affected because these decisions are influenced and made by people with more distance between them and the economic events. As a consequence, the primary benefits of recasting data to reflect inflation may accrue to the public as a whole because government policies to achieve full employment and economic growth, while controlling inflation, may be improved.

Appendix A: "Methodology to Estimate Restated Inventory, Fixed Assets, and Monetary Gains and Losses" (25pp.), and

Appendix B: "Variables Definitions and Calculations" (18pp.)

are available on request from the Division of Research at copying cost.

APPENDIX A - METHODOLOGY

METHODOLOGY TO ESTIMATE RESTATED INVENTORY (COST OF GOODS SOLD), FIXED ASSETS (DEPRECIATION), AND MONETARY GAINS AND LOSSES

There are four basic parts to this appendix. The first part gives the definitions and calculations of the price indexes; the net three parts discuss the methodology to estimate general price-level (GP-L) (1) inventories (costs of goods sold); (2) fixed, non-monetary assets (depreciation); and (3) monetary gains and losses. The First two parts involve two basic sets of calculations. First, it is necessary to estimate GP-L inventories and fixed assets as of the beginning of fiscal year 1964 for each firm. To do so, it is necessary in many cases to base the estimates on Compustat data going back to 1955. Second, once the end-of-year 1963, GP-L balance sheet variables have been estimated, both changes in balance sheet variables and income statement variables for years from 1964 through 1973 can be estimated. For monetary gains and losses only data from 1963 (year-end) through 1973 are needed.

Each section begins with a brief statement of the problem and a short description of how other studies have handled it. Next, the methodology in the present study is given by first defining new variables in terms of the raw variables

as given on the Compustat tapes (identified in the following pages by the Compustat variable number enclosed below in parentheses). Only whole integers (1-60) are used to denote Compustat variables. Decimal points are used for identifying new variables that are defined and calculated in this study.

Price Index Definitions and Calculations (0.1-0.2)

For purposes of general price-level adjustments, the GNP implicit price deflator is used. In the inventory methodology, we use deflators as estimated by linear interpolation of quarterly deflators. The GNP deflators for each of the four quarters and the annual average deflator are taken from the FASB Exposure Draft, December 1975, p. 35.

The two most frequently used price indexes are the year-end deflator (as of December 31) and the annual average deflator. These are denoted as P_n and AP_n respectively. AP_n is inputted into the programs directly. P_n is estimated as the average of year n's fourth quarter index and year (n + 1)'s first quarter index because quarterly indices are the average for that quarter. In other words, the fourth quarter index would be approximately where the index

stood at November 15 (or 10.5 months from the beginning of the year). The average of 4th and 1st quarter indexes gives the index at year-end, or beginning of year n + 1.

0.1 P_n = (4th quarter deflator for year n + 1st quarter deflator for year n + 1)/2

0.2 let AP_n = denote average deflator for year n.

For inventories, monthly indexes are linearly interpolated using the two nearest quarterly indexes. To illustrate take the following hypothetical example. Let the year be 1970, i.e., n = 70. Each quarter's index is designated by the number of months from the beginning of the year. The quarter index is taken as the price index for the middle of the quarter. Therefore, the first quarter index is for month (m) 1.5 and the second quarter's index is for month 4.5 etc.

In general, the notation is P_{nm} to designate the price index (P) for year n at month m.

P70,1.5	P70,4.5	P70,7.5	P70,10.5	P71,1.5
1.00	1.03	1.06	1.09	1.12

The calculation of P_n, the price index at year-end 1970 is (see 0.1)

$$P_n = (P_{n,10.5} + P_{n+1,1.5})/2 = (1.09 + 1.12)/2 = 1.105$$

The calculation for a month, say at the end of August (m = 8) is: (The two nearest months are 10.5 and 7.5.

$$0.3 \quad P_{nm} \left[(8 - 7.5)/(10.5 - 7.5)\right] (1.09 - 1.06) + 1.06 = 1.065$$

Note: The value inside the brackets gives the fraction that month m is from the earlier quarter to the latest quarter. In this case, 8 is 1/6 of the way between 7.5 and 10.5. This fraction multiplied by the absolute difference between the deflators added to the earlier deflator gives the estimated deflator for month m.

INVENTORIES (1.0-4.0)

Inventories are a non-monetary asset whose change in real economic value is independent from changes in the value of the dollar. The problem arises because inventories are either physically held or the costs of inventory are treated as if they were held over time when the value of the dollar changes. The flow of costs is different under the different methods of inventory costing. The three predominant costing methods are first-in, first-out (FIFO), last-in last-out (LIFO) and average cost (AC). Each firm's GP-L inventory valuations (and the cost of goods sold) depend upon which method is used. Therefore, a methodology must be developed for each method. At the end of this section the methodology for treating changes in methods used by a firm over time are presented. The procedures in this section are similar to those used by Davidson and Weil in "Inflation Accounting," Financial Analysts Journal (January-February 1975), p. 27. It is noted however, that those authors made adjustments only for the single year of 1973 and only for income statement variables.

FIFO

Under the FIFO assumption, the ending inventory cost consist of the costs of the latest goods purchased. The cost of goods sold during the year consists all or part of the cost of the beginning inventory plus a part of the cost of current year purchases.

To estimate the inventory for 1963 (year-end) or (beginning of year 1964), only the calculations for inventory are required. (See steps 1.10 and 1.20, 1.21).

1.1 Restatement of Cost of Goods Sold (1964-1973)

First, calculate purchases for the year (PCH_n):

1.10 $PCH_n = \underset{(3)}{I_n} - \underset{(3)}{I_{n-1}} + \underset{(41)}{CG_n}$

Then calculate the amount of purchases which went to cost of goods sold ($CPCH_n$)

1.11 $CPCH_n = \underset{(41)}{CG_n} - \underset{(3)}{I_{n-1}}$

Usually, beginning inventory will be entirely eliminated.

1.12 If $CPCH_n<0$, go to 1.4 ; otherwise next, calculate the month (m) in year n in which it is assumed that these purchases, which went to cost of goods sold, were bought.

To accomplish this, we assume purchases we acquired evenly throughout the year. Therefore, the fraction $CPCH_n/PCH_n$ gives that fraction of the year it took to acquire those purchases that were sold during the year. Multiplying this fraction by 12 months gives the number of months it took to acquire those purchases.

For example, assume the fraction of CPCH/PCH is 1/3. Under FIFO, the current purchases, going to cost of goods sold, were acquired during the first 4 months of the year (1/3 x 12). On the average then, these purchases can be treated as if they were all acquired at end of second month. (4 months/2 = 2nd month).

This calculation is summarized as:

1.13 $$m_n^* = (1/2 \times 12)\ \underset{(1.11)}{(CPCH_n)}/\underset{(1.10)}{PCH_n}$$

where: m_n^* is the month of year n in which purchases are assumed to have been made (rounded to one decimal point, i.e., 4.3)

Restated purchases that went to cost of goods sold ($RCPCH_n$):

1.14 $$RCPCH_n = \underset{(1.11)}{(CPCH_n)}\ (P_n/P_{nm})$$

where: P_{nm} is the price index for year n at month m. (see 1.13 for m)

Restated beginning inventory that went to cost of goods sold (RCI_n) is:

1.15 $RCI_n = (RI_{n-1}) (P_n/P_{n-1})$
(1.21)

Restated cost of goods sold (RCG_n) is the sum of the two components:

1.16 $RCG_n = RCI_n + RCPCH_n$
(1.15) (1.14)

1.2 Restatement of Inventory (RI_n)

Under FIFO ending inventory came from purchases during the latter part of the year. Because it is assumed that purchases are acquired evenly throughout the year, and the purchases for the first months (assumed to have been acquired on the average at month m went to cost of goods sold, the purchase in ending inventory are assumed to have been acquired at end of month "p".

1.20 $p = 12 - 6 (I_n/PCH_n)$

Restatement of ending inventory is

1.21 $RI_n = (I_n) (P_n/P_{np})$

1.31 Subsequent years:

Repeat 1.1 through 1.21 (1.40).

1.4 In rare circumstances, beginning inventory may not be entirely eliminated, i.e., $CPCH_n<0$.

Only part of the beginning inventory went to cost of goods sold.

1.41 $RCG_n = (CG_n/I_{n-1})\ (RI_{n-1})\ (P_n/P_{n-1})$
(41) (3) (1.21)

Then the remainder of beginning inventory and all of the current purchase become ending inventory.

1.42 $RI_n = (1 - (CG_n/I_n))\ (RI_{n-1})\ (P_n/P_{n-1}) +$
(41) (3) (1.21)

$PCH_n\ (P_n/AP_n)$
(1.10)

1.5 For Subsequent Years Start at 1.10

LIFO

Under the LIFO method, the latest goods purchased are the first goods sold and ending inventory is, therefore, composed of the beginning inventory plus the first-of-the-year unsold purchase. Thus each year's ending inventory is composed of the sum of this and all previous years increments (layers).

2.1 thru 2.4 Restating Year-End 1963 Inventory

The first step is to determine the restated inventory for year-end 1963, which is composed of all the previous increments to inventory (layers). We begin by determining the amount and year of these layers.

Beginning with n = 63 and going back to n - i = 55 (where i runs from 0 to 8); calculate the change in inventory (CI) for each of the eight years. Assume that 1955 ending inventory was all acquired in 1954.

let $CI_{55} = I_{55}$.

For convenience, let t = n - i, so that t goes from 63 to 56 to calculate changes:

2.10 $$CI_t = \underset{(3)}{I_t} - \underset{(3)}{I_{t-1}}$$

Also calculate the purchases each year as they will be needed latter:

2.11 $$PCH_t = \underset{(2.10)}{CI_t} + \underset{(41)}{CG_t}$$

From these changes in inventory (CI_t), the layers (L) of 1963 inventory can be identified; If during a year inventories increased ($CI_t > 0$), then this is identified as a layer in 1963 inventory. Beginning with t = 63 and continuing until t = 55:

2.2 Inventory Increase, i.e., $CI_t \geq 0$

An increase in year t's inventory becomes a part of next year's (t + 1) beginning inventory:

2.20 If $CI_t \geq 0$, otherwise go to 2.31.

2.21 then set $L_t = CI_t$ (2.10)

where: L_t is a layer of 1963 ending inventory acquired in year t.

continue until t = 55, (go to next year)
Go to 2.43

2.3 Inventory Decrease, i.e., $CI_t < 0$

If $CI_t < 0$, then inventories decreased in year t and part of the beginning of year inventory (a previous year's layer) was sold. Therefore, the calculated change in the previous year's inventory (CI_{t-1}) needs to reduce by this amount, i.e., CI_t (where $CI_t < 0$).

2.31 If $CI_t < 0$ (2.10)

2.32 then set $L_t = 0$; no layer was acquired in year t.

The previous year's layer (CI_{t-1}) is reduced as it was in part, or in whole, sold in year t.

2.33 set $CI_{t-1} = CI_{t-1} + CI_t$

where: $CI_t < 0$
Continue through t=55, (go to next year)
Go to 2.43

The foregoing has estimated the amount and year of the 1963 layers. Now, these layers are restated to 1963 year-end dollars. Beginning again with t = 63 and going back to 1955, we calculate the month (m) in year t in which t year's layer was acquired. (Note: for some years, L_t may equal 0). However, I_{63} must be equal to $\sum_{t=55}^{63} L_t$.

To calculate the month (m) in which the layer is assumed to have been acquired we repeat the assumptions from section 1.13 earlier:

2.41 $m_t = (1/2 \times 12) \underset{(2.21)}{(L_t/PCH_t)} \underset{(2.11)}{}$

Therefore, with the month of acquisition identified, we can calculate the layer restated to year-end dollars.

2.42 $RL_t = (L_t)\ (P_t/P_{tm})$

2.421 for t=55, $RL_t = (CI_t)(P_t/P_{54})$ and go to 2.45

Change in method:

The process of calculating layers continues by repeat steps 2.20 and 2.21 and 2.21 or 2.31 thru 2.33 for each year through 1955. However, there may have been a change in inventory methods from LIFO to FIFO or to average cost during the years 1962 thru 1956. Therefore, before going to the next year, a

check is first made of the inventory method in use for the new year. Let IM indicate inventory method (compustat variable number 59) where 1 = FIFO, 2 = LIFO and 4 = Average Cost.

2.43 If IM = 2, continue with 2.20, otherwise go to 2.431.

2.431 If IM = 1, continue with 2.4311, otherwise go to 2.432.

If the new inventory method was FIFO, i.e., in year t FIFO was used and in year t+1 LIFO was used, then the rest of inventory layers for 1963 were all acquired in year t.

However, not all of year t inventory may remain as a layer of 1963 inventory if, in subsequent years part was sold. If this were the case, then $C_{t+1}<0$ and that years layer must be reduced by the subsequent years liquidation.

2.4311 If $C_{t+1}\geq 0$, set $L_t=I_t$, otherwise go to 2.43111

2.43111 If $C_{t+1}<0$, set $L_t=I_t + C_{t+1}$

2.4312 $M_t = 12-6\ (L_t/PCH_t)$

2.4313 $RL_t = L_t\ (P_t/P_{tm})$

go to 2.45 as all layers in 1963 inventory have been identified.

2.432 If IM = 4, continue with 2.4321.

If average cost is used in year t, we will assume that the entire inventory for year t was acquired in year t and hence becomes the layer of 1963 ending inventory.

2.4321 If $C_{t+1} \geq 0$ set, $L_t = I_t$, otherwise go to 2.43211.

2.43211 If $C_{t+1} < 0$, set $L_t = I_t + C_{t+1}$.

Furthermore, we assume it was all acquired at year t's average prices.

2.4322 $RL_t = L_t \ (P_t \ / AP_t)$

go to 2.45 as all layers in 1963 inventory have been identified.

Having restated all layers of 1963 inventory, we accumulate these to obtain restated 1963 ending inventory. These RL_t's are retained as they will be needed in later calculations.

2.45 $$RI_{63} = \sum_{t=55}^{63} (RL_t)(P_{63}/P_t)$$

2.5 - 2.9 Subsequent Years (1964-1973)
(n goes from 64 thru 73)

Having restated 1963 year-end inventory (1964 beginning-of-year inventory), we can use these data and the data for 1964-1973 to calculate restated cost of goods sold and restated inventories.

To calculate restated inventory and cost of goods sold when there is an inventory increase is relatively simple; for

an inventory decrease, the process is complex. First, we calculate the inventory change (here labelled L_n rather than CI_n), and calculate the purchases (PCH_n) for the year.

2.5 Calculate new layer (L) and purchases (PCH):

2.51 $L_n = I_n - I_{n-1}$

2.52 $PCH_n = L_n + CG_n$

2.6 Inventory Increase ($L_n \geq 0$)

2.61 If $L_n \geq 0$, continue; otherwise go to 2.7)
then inventory increased and a new layer was added in year n which is assumed to have been acquired at end of month m (see 2.41)

2.62 $m_n = 6(L_n/PCH_n)$

Next, the restated layer is calculated (as we need to keep track of all layers in case it is sold in subsequent years.

2.63 $RL_n = (L_n)\ (P_n/P_{nm})$

Restated ending inventory is found by adding this restated layer to the previous year's restated inventory. However, last year's restated inventory is first restated to this year's end-of-year dollars.

2.64 $RI_n = (RI_{n-1})\ (P_n/P_{n-1}) + RL_n$

Next cost of goods sold is restated when inventory has increased (if $L_n>0$). All goods sold have come from current purchases, in particular, only the latest purchases. Following previous methodology (see 1.13) the purchases that were sold are calculated to have been acquired (1/2 x 12) (CG_n/PCH_n) months before the end of the year. Therefore, the month (p) which they were acquired is calculated as:

2.65 $p = 12 - 6\ (CG_n/PCH_n)$

Therefore, restated cost of goods sold is:

2.66 $RCG_n = (CG_n)\ (P_n/P_{np})$

2.7 Inventory Decrease L<0)

If in subsequent years, inventory is decreased, then part of beginning inventory (year n-1, year-end inventory) was sold. This case becomes more complex because we have to determine the amount and date of acquisition of the amount sold. The previous layers, beginning with the most recent (n-1) are reduced or eliminated until an L_{n-1} remains positive after the reduction. The year t (n-1), and the amounts taken from each layer must be identified and calculated.

2.71 If $L_n<0$, set $DIP_n = L_n$ (see below).

Because there is no layer in the current year and layers must be kept track of:

2.72 Set $L_n = 0$ and $RL_n = 0$.

The process of restating cost of goods sold begins by initializing an accumulating variable (DIP_n) which stands for the amount that previous layers are dipped into. (see 2.71) Backward scanning proceeds by letting i go from 1 to 18, i.e., t goes from (n-1) to (n-18). It is (n-18), only if the entire inventory is sold in 1973.

Beginning with i= 1 (i.e., t = n-1), subtract the DIP from previous layers until a positive layer remains. In other words, we first assume that year n's inventory sales came from year (n-1) layer. If more was sold in year n than was "acquired" in year n-1, then we have to go back to year n-2, and so on. DIP is used as an accumulating variable, that essentially adds up the previous year's layers until they are large enough to account for year n's inventory sales.

Beginning with i-1 (i.e., t = n-1).

2.73 set $DIP_t = L_t + DIP_n$ (DIP_n is negative).

If the previous year's (t = n-1) layer is less than DIP_n, then year n-1 layer was completely sold in year n, and must be restated into year n end-of-period dollars. Because cost of goods sold in year n is now an accumlation of inventory sales from several years, we need to keep tract. To do so we use an accumulating variable called RDIP, which sums these layers in year n dollars.

2.74 If $DIP_t \leq 0$ continue; otherwise go to 2.76.

2.751 $RDIP_n = (RL_t)\ (P_n/P_t) + RDIP_t$.

Note: initialize $RDIP_t$ at 0.

Because the entire layer from year t has been sold in year n, this layer is eliminated:

2.752 Set $L_t = 0$, and $RL_t = 0$.

Then go to the next year, i.e., t = n-2 and go back to 2.73. This process is continued until the amount sold from the inventory in year n has been eliminated from previous accumulated layers. This occurs when the accumulated dip becomes a positive number. In that year, only part of that years layer has been sold. In this case, the amount in DIP_t is the amount of that year's layer which

remains unsold. Therefore, the total accumulated dip restated to n year-end dollars is calculated as:

2.76 If $DIP_t > 0$

2.761 set $RDIP_n = RDIP_t + RL_t \ (P_n/P_t) \ (1-DIP_t/L_t)$

where: $(RL_t) \ (P_n/P_t)$ is the entire layer in year t restated to n year dollars; $1-DIP_t/L_t$ is that fraction of year t layer which is eliminated from inventory (the L_t) and goes to cost of goods sold in year n.

2.762 set $RL_t = (RL_t) \ (DIP_t/L_t)$

where: DIP_t/L_t is the fraction of that years layer which remains in inventory.

2.763 set $L_t = DIP_t$

2.8 Restated Ending Inventory In Year n for Inventory Decrease in Year n

After having eliminated all or some of previous year(s) inventory layers, the n year-end inventory restated to year-end n dollars is calculated:

2.81 $RI_n = (RI_{n-1}) \ (P_n/P_{n-1}) - RDIP_n$

where: $(RI_{n-1}) \ (P_n/P_{n-1})$ is what ending inventory would have been at the end of the year (in n dollars) if there had been no change in inventory.

2.9 Restated Cost of Goods Sold In Year n For An Inventory Decrease In Year n

2.91 $RCG_n = PCH_n \ (P_n/AP_n) + RDIP_n$.

AVERAGE COST

Under average cost method, no sequential or chronological order is given to movement of inventory costs. Total goods available for sale in year n is simply divided into inventory and cost of goods sold.

Assume that inventory of 1963 was all bought in 1963, therefore restated inventory 1963.

3.0 $RI_{63} = (I_{63}) \ (P_{63}/AP_{63})$

after RI_{63} is found repeat sets 3.1-3.5 for all subsequent years, i.e., begin step 3.1 for 1964-1973.

Total goods available for sale is (GAS):

3.1 $GAS_n = I_{n-1} + PCH_n$

where;

3.2 $PCH_n = I_n - I_{n-1} + CG_n$

restated goods available for sale is (RGAS):

3.3 $RGAS_n = (RI_{n-1}) \ (P_n/P_{n-1}) + (PCH_n) \ (P_n/AP_n)$

The proportion of GAS going to cost of goods sold is (CG_n/GAS_n) and restated cost of goods sold is:

3.4 $RCG_n = (CG_n/GAS_n) \ (RGAS_n)$

Restated inventory for year n is:

3.5 $RI_n = RGAS_n - RCG_n$

repeat steps 3.1-3.5 for next year.

Changes in Inventory Method (4.0)

Because better than one-fourth of the firms in this panel changed their predominant method of inventory costing during the 1955-1973 period, a routine was established for these cases. Changes in methods during the period from 1955-1963 are irrelevant when the 1963 method is FIFO or Average Cost. This is because pre-1963 data are not used to estimate 1963 ending inventory. For LIFO, a problem is encountered. This treatment is previously given in section 2.4.

This section pertains only to changes in methods during the 1964-1973 period. Again, the only problem encountered is when the switch is from average cost or FIFO to LIFO. In either case, it is first necessary to begin identifying layers. If a switch in inventory method occurred in year n, then the ending inventory of year n-1 becomes a layer.

4.10 set $L_{n-1} = I_{n-1}$

4.11 set $RL_{n-1} = RI_{n-1}$

and go to 2.51 and continue as if LIFO were always used.

A switch to FIFO or to Average Cost, requires no special treatment, if as is the case for 1964-1973, the previous year's restated ending inventory is known. Therefore, if in year n the switch is to FIFO, go to 1.10 and continue and if the switch is to Average Cost go to 3.1 and continue.

FIXED ASSETS

The details of the adjustments for restated fixed assets and depreciation are not given here. The interested reader is referred to Appendix D of my book Industrial Market Structure and Performance: 1960-1968 (Division of Research, Graduate School of Business Administration, University of Michigan, 1975). Here the details are given for estimating current cost net plant and depreciation and the historical cost figures. With rather obvious and simple modifications to the procedures given therein, these procedures are adapted for general-price level adjustments.

MONETARY GAINS AND LOSSES

During inflation, a firm loses if it holds monetary assets whose real value falls because they are assets which are fixed in terms of the numbers of dollars. During inflation, each dollar becomes less valuable. Also, during inflation, the stockholder's gain because the amount of debt is also fixed in numbers of dollars. Because each dollar of debt over a period of inflation decreases in terms of purchasing power, stockholders gain when the liabilities become less of a real burden over time.

It is noted initially that for the entire firm, that is for all suppliers of capital, there are no borrowing gains. The gains to stockholders are offset by losses to creditors.

5.1 Monetary Losses

Monetary Assets

5.12 $MA_n = \underset{(1)}{CASH_n} + \underset{(2)}{REC_n}$

Average monetary assets

5.13 $AMA_n = (MA_n + MA_{n-1})/2$

Monetary Losses

5.14 $ML_N = (AMA_n)\ [(P_n/P_{n-1}) - 1]$

Monetary Liabilities

5.21 $ML_n = \underset{(5)}{CLIA_n} + \underset{(9)}{LTD_n} + \underset{(10)}{PL_n}$

Average Monetary Liabilities

5.31 $AML_n = (ML_n + ML_{n-1})/2$

Borrowing Gains

5.41 $BG_n = (AML_n)\ [(P_n/P_{n-1}) - 1]$

Stockholder Net Borrowing Gains

5.51 $SNBG_n = BG_n - ML_n$

Where:

CASH = Cash and Equivalent

REC = Receivables

CLIA = Total Current Liabilities

LTD = Long Term Debt

PL = Preferred Stock (Liquidating Value)

APPENDIX B - VARIABLES

VARIABLES DEFINITIONS AND CALCULATIONS

This section presents the equations used to calculate the approximately 80 variables generated for each firm in each year. The great majority of these 80 variables are intermediate variables which are in turn used to calculate other variables. The number of variables actually analyzed is considerably smaller. The 80 variables are calculated from combinations of the original 26 Compustat variables, variables as calculated in the inventory or fixed assets sections, and from other variables generated in this section.

The variable generated or being defined occupies the left-hand side of the equation. Each of these equations are numbered so that when that variable is, in turn, used to generate another variable, the reader can cross-reference. All such equations are numbered using integers followed by a decimal point and more integers (i.e., 10.115).

The variables on the right-hand side of each equation are identified by reference (below in parentheses) to these equation numbers if the variables are defined in this section. Whole integers (no decimal points) are used to denote a variable taken directly from the Compustat tapes. The numbers range from 1-60 and correspond to the data item numbers given in the Compustat manual. Variables

that are defined in the inventory section are identified by a capital I in parentheses (I). The reader is referred to Appendix A--Inventories. Variables coming from the section on fixed assets are denoted by an X in parentheses (X).

The detailed methodology for Fixed Assets is not included in this paper.1/ There are roughly two dozen variables from the fixed asset subroutine used to generate only four key variables which are used in this study. These four variables and a brief description are given below:

Variables Related to Fixed Assets (X)

Historic Cost Net Plant (HCNP)

HCNP is the net plant that results from assuming a straight-line depreciation policy and a useful life estimated as the average ratio gross plant to depreciation. This is the non-restated (for GP-L adjustments) counterpart of the restated estimates. (See the fixed asset section in Part II for a discussion).

1/ See Appendix D of Daryl Winn Industrial Market Structure and Performance: 1960-1968.

Restated Net Plant (RNP)

RNP is HCNP but adjusted to changes in the GNP implicit deflator between the time the asset was caluclated to have been acquired and the present time.

Historic Cost Depreciation HCDEP

HCDEP is the amount of unadjusted depreciation that results from the assumptions given above for HCNP.

Restated Depreciation (RDEP)

RDEP is the amount of GP-L adjusted depreciation that results from the calculations for RNP.

The following 80 equations (variable calculations) are organized by balance sheet, income statement and miscellaneous variables and by reported (as presented to stockholders), historical (as calculated under assumptions for fixed assets), and by restated variables. All equations should be self-explanatory except 10.01 and 13.01 which are basic adjustments to the reported asset and income totals respectively. These adjustments are made to conform to the discussion of these measures given earlier in the Key Variable discussion (Part II).

GENERATED VARIABLES

10.0 Reported Balance Sheet Items

Asset Adjustment

10.01 $AADJ_n$ = Investment in and Advances to Subsidiaries$_n$ (31) + Unconsolidated Subsidiaries--Excess Equity$_n$ (53)

Total Assets

10.1 TA_n = Total Assets--Liabilities plus Net Worth$_n$ (6) - $AADJ_n$ (10.01)

Common Equity[1/]

10.2 CE_n = Common Equity$_n$ (11) + Intangibles$_n$ (33) - $AADJ_n$ (10.01) + Minority Int$_n$ (38)

Average Assets

10.3 $ATA_n = (TA_n + TA_{n-1})/2$ (10.1)

Average Common Equity

10.4 $ACE_n = (CE_n + CE_{n-1})/2$ (10.4)

1/ Common equity on the Compustat tapes is defined net of intangibles.

11.0 Historic Cost Balance Sheet Items

Historic Cost Adjustment

11.01 $HCADJ_n = \underset{(x)}{HCNP_n} - \underset{(8)}{Net\ Plant_n}$

(x) indicated from fixed asset subroutine

Historic Total Assets

11.1 $HTA_n = \underset{(10.1)}{TA_n} + \underset{(11.01)}{HCADJ_n}$

Historic Common Equity

11.2 $HCE_n = \underset{(10.2)}{CE_n} + \underset{(11.01)}{HCADJ_n}$

Average Historic Assets

11.3 $AHA_n = (\underset{(11.1)}{HTA_n} + \underset{(11.1)}{HTA_{n-1}})/2$

Average Historic Common Equity

11.4 $AHCE_n = (\underset{(11.2)}{HCE_n} + \underset{(11.2)}{HCE_{n-1}})/2$

12.0 Restated Balance Sheet Items

Balance Sheet Restated Adjustment

12.1 $BRAD_n = (\underset{(I)}{RI_n} + \underset{(x)}{RNP_n}) - (\underset{(3)}{I_n} + \underset{(8)}{NP_n})$

Restated Total Assets

12.2 $RTA_n = \underset{(10.1)}{TA_n} + \underset{(12.1)}{BRAD_n}$

Restated Common Equity

12.3 $RCE_n = CE_n + BRAD_n$
(10.2) (12.1)

Year Average of Assets

12.4 $ARA_n = [RTA_n + (RTA_{n-1})\ (P_n/P_{n-1})]/2$
(12.2) (12.2)

Year Average of Common Equity

12.5 $ARE_n = [RCE_n + (RCE_{n-1})\ (P_n/P_{n-1})]/2$
(12.3) (12.3)

13.0 Reported Income Statement

13.01 IA_n = Operating $Income_n$ (13) - $Depreciation_n$ (14) - Net $Income_n$ (18) - Extraord. Income (17) + Uncons. Remit. $Earn_n$ (55) - Fixed $Charges_n$ (15) - Income Tax_n (16) - Minor. Int_n (49)

Note: A positive IA = misc. expense, a neg. = misc. income.

Earnings Before Interest and Taxes

13.1 $EBIT_n$ = Operating $Income_n$ (13) - $Depreciation_n$ (14) - IA_n (13.01)

Stockholder Earnings (Common) Before Taxes

13.2 $EBT_n = EBIT_n$ (13.1) - Fixed $Charges_n$ (15) - Preferred $Dividends_n$ (19)

Note: Minority interest is included, excluded are extraordinary earnings and earnings from unconsolidated subsidiaries.

Stockholder Earnings After Tax

13.3 $EAT_n = EBT_n - \text{Income Taxes}_n$
(13.2) (16)

14.0 Historic Cost Income Statement Items

Historic Cost Depreciation Adjustment

14.01 $HDEPA_n = \text{Depreciation amd Amortization}_n - HCDEP_n$
(14) (x)

Historic Earnings Before Interest and Taxes

14.1 $HEBIT_n = EBIT_n + HDEPA_n$
(13.1) (14.01)

Historic Earnings Before Taxes

14.2 $HEBT_n = EBT_n + HDEPA_n$
(13.2) (14.01)

Historic Earnings After Taxes

14.3 $HEAT_n = HEBT_n - \text{Income Taxes}$
(14.2) (16)

15.0 Restated Income Statement Items

Restated Net Sales

15.1 $RS_n = \text{Sales}_n (P_n/AP_n)$
(12)

Restated Depreciation Adjustment

15.2 $RDEPA_n = RDEP_n - HCDEP_n$
(x) (x)

Restated Cost of Goods Sold Ajustment

15.3 $RGSA_n = RCG_n - \text{Cost of Goods Sold}_n$
(I) (41)

Restated Earnings Before Taxes and Interest

15.4 $REBIT_n$ = (Operating $Income_n$ + Cost of Goods $Sold_n$ - IA_n) (P_n/AP_n) - $(RCG_n + RDEP_n)$
(13) (41) (13.01) (I) (x)

Restated Earnings Before Taxes

15.5 $REBT_n$ = $REBIT_n$ - (Fixed $charges_n$ + Preferred $Dividends_n$)
(15.4) (P_n/AP_n) (15) (19)

Restated Earnings After Taxes

15.6 $REAT_n$ = $REBT_n$ - Income $Taxes_n$ (P_n/AP_n)
(15.5) (16)

Restated Earnings Before Taxes with Borrowing Gains

15.7 $REBTM_n$ = $REBT_n$ + $SNBG_n$
(15.5) (5.51)

Restated Earnings After Taxes with Borrowing Gains

15.8 $REATM_n$ = $REAT_n$ + $SNBG_n$
(15.6) (5.51)

16.0 Rate of Return Measures

16.1 Reported
Operating Return Before Interest and Taxes

16.11 ORB_n = $EBIT_n/ATA_n$
(13.1)(10.3)

Stockholder Return Before Taxes

16.12 SRB_n = EBT_n/ACE_n
(13.2)(10.4)

Stockholder Return After Taxes

16.13 $SRA_n = EAT_n/ACE_n$
(13.3)(10.4)

16.2 Historic Cost

Historic Returns Before Interest and Taxes

16.21 $HORB_n = HEBIT_n/AHA_n$
(14.1) (11.3)

Historic Stockholder Returns Before Taxes

16.22 $HSRB_n = HEBT_n/AHCE_n$
(14.2)(11.4)

Historic Stockholder Returns After Taxes

16.23 $HSRA_n = HEAT_n/AHCE_n$
(14.3)(11.4)

16.3 Restated

Restated Operating Return Before Interest and Taxes

16.31 $RORB_n = REBIT_n/ARA_n$
(15.4) (12.4)

Restated Stockholder Return Before Taxes

16.32 $RSRB_n = REBT_n/ARE_n$
(15.5) (12.5)

Restated Stockholder Return After Taxes

16.33 $RSRA_n = REAT_n/ARE_n$
(15.6)(12.5)

Restated Stockholder Return Before Taxes with Monetary Gains

16.34 $RSRBM_n = \underset{(15.7)}{REBTM_n} / \underset{(12.5)}{ARE_n}$

Restated Stockholder Return After Taxes with Monetary Gains

16.35 $RSRAM_n = \underset{(15.8)}{REATM_n} / \underset{(12.5)}{ARE_n}$

17.0 Miscellaneous Variables

Reported Asset Growth

17.11 $AG_n = (\underset{(10.1)}{TA_n} - \underset{(10.1)}{TA_{n-1}}) / \underset{(10.1)}{TA_{n-1}}$

Historic Asset Growth

17.12 $HAG_n = (\underset{(11.1)}{HTA_n} - \underset{(11.1)}{HTA_{n-1}}) / \underset{(11.1)}{HTA_{n-1}}$

Restated Asset Growth

17.13 $RAG_n = ((\underset{(12.2)}{RTA_n} - \underset{(12.2)}{(RTA_{n-1})}(P_n/P_{n-1})) / ((\underset{(12.2)}{RTA_{n-1}})(P_n/P_{n-1}))$

Reported Sales Growth

17.21 $SG_n = (\underset{(12)}{Sales_n} - \underset{(12)}{Sales_{n-1}}) / \underset{(12)}{Sales_{n-1}}$

Restated Sales Growth

17.22 $RSG_n = ((\underset{(15.1)}{RS_n} - \underset{(15.1)}{(RS_{n-1})}(P_n/P_{n-1})) / \underset{(15.1)}{(RS_{n-1})}(P_n/P_{n-1})$

Reported Asset/Sales Ratio

17.31 $ASRAT = \underset{(11.3)}{AHA_n} / \underset{(12)}{Sales_n}$

Restated Asset/Sales Ratio

17.32 $RASRAT_n = \underset{(12.4)}{ARA_n} / \underset{(15.1)}{RS_n}$

Reported Debt/Equity Ratio

17.41 $DERAT_n = \underset{(5.31)}{AML_n} / \underset{(11.4)}{AHCE_n}$

Restated Debt/Equity Ratio

17.42 $RDERAT_n = \underset{(5.31)}{AML_n} / \underset{(12.5)}{ARE_n}$

Reported Tax Rate

17.51 $TR_n = \underset{(16)}{\text{Income Taxes}_n} / (\underset{(13.2)}{EBT_n} + \underset{(19)}{\text{Preferred Dividends}_n})$

Historic Tax Rate

17.52 $HTR_n = \underset{(16)}{\text{Income Taxes}_n} / (\underset{(14.2)}{HEBT_n} + \underset{(19)}{\text{Preferred Dividends}_n})$

Restated Tax Rate

17.53 $RTR_n = (\underset{(16)}{\text{Income Taxes}_n})\ (P_n/AP_n) / (\underset{(15.5)}{REBT_n} + (\underset{(19)}{\text{Preferred Dividends}_n})(P_n/AP_n))$

Reported Dividends

17.60 $DIV_n = \underset{(21)}{\text{Common Dividends}_n}$

Restated Dividends

17.61 $RDIV_n = \underset{(17.60)}{(DIV_n)}(P_n/AP_n)$

Restated Capital Expenditures

17.62 $RCEX_n$ = (Capital Expenditures$_n$)(P_n/AP_n)
(30)

Restated Earnings Retained

17.63 $RER_n = REAT_n - RDIV_n$
(15.6) (17.61)

Historic Earnings Retained

17.64 HER_n = $HEAT_n$ - (Common Dividends$_n$)
(14.3) (21)

Historic Capital Expenditure Coverage

17.65 $HCECOV_n$ = ($HCDEP_n$ + $HEAT_n$ - Common Dividends$_n$)/
(x) (14.3) (21)
(Capital Expenditures$_n$)
(30)

Restated Capital Expenditures Coverage

17.66 $RCECOV_n$ = ($RDEP_n$ + $REAT_n$ - $RDIV_n$)/($RCEX_n$)
(x) (15.6) (17.61) (17.62)

Restated Fixed Charges

17.67 $RFCHG_n$ = (Fixed Charges$_n$)(P_n/AP_n)
(15)

Reported Inventory - Sales Ratio

17.71 ISR_n = Inventory/Net Sales
(3) (12)

Restated Inventory - Sales Ratio

17.72 $RISR_n = RI_n/RS_n$
(I) (15.1)

Reported Fixed Charge Coverage

17.73 $FCCOV_n$ = $HEAT_n$/Fixed Charges
(14.3) (15)

Restated Fixed Charge Coverage

17.74 $RFCCOV_n$ = $REAT_n/(RFCHG_n)$
(15.6) (17.67)

17.8 Absolute Profit Differences

17.81 $CHEBIT_n$ = $EBIT_n$ - $HEBIT_n$
(13.1) (14.1)

17.82 CREBIT = $HEBIT_n$ - $REBIT_n$
(14.1) (15.4)

17.83 $CHEBT_n$ = EBT_n - $HEBT_n$
(13.3) (14.2)

17.84 $CREBT_n$ = $HEBT_n$ - $REBT_n$
(14.2) (15.5)

17.85 $CHEAT_n$ = EAT_n - $HEAT_n$
(13.3) (14.3)

17.86 $CREAT_n$ = $HEAT_n$ - $REAT_n$
(14.3) (15.6)

17.87 $CREATM_n$ = $HEAT_n$ - $REATM_n$
(14.3) (15.8)

17.9 Miscellaneous GP-L Adjustment Ratios

Cost of Goods Sold Adjustment Ratio

17.91 $CGSRAT_n = RGSA_n / REATM_n$
(15.3) (15.8)

Depreciation Adjustment Ratio

17.92 $DEPRAT_n = RDEPA_n / REATM_n$
(15.2) (15.8)

Monetary Losses Ratio

17.93 $MLRAT_n = ML_n / REATM_n$
(5.14)(15.8)

Borrowing Gain Ratio

17.94 $BGRAT_n = BG_n / REATM_n$
(5.41)(15.8)

Net Borrowing Gain Ratio

17.94 $NBGRAT = SNBG_n / REATM_n$
(5.51) (15.8)

18.0 Stock Market Ratios

18.10 $MKVAL_n$ = (Price-Close) (Common $Shares_n$)
(24) (25)

18.11 $MEAT_n = MKVAL_n / EAT_n$
(18.10) (13.3)

18.12 $MHEAT_n = MKVAL_n / HEAT_n$
(18.10) (14.3)

18.13 $MREAT_n = MKVAL_n/REAT_n$
(18.10)(15.6)

18.14 $MREATM_n = MKVAL_n/REATM_n$
(18.10) (15.8)

18.15 $MCE_n = MKVAL_n/CE_n$
(18.10)(10.2)

18.16 $MHCE_n = MKVAL_n/HCE_n$
(18.10)(11.2)

18.17 $MRCE_n = MKVAL_n/RCE_n$
(18.10)(12.3)

19.1 Calculation of Period Averages - Average of Yearly Variables

Let X_n represent all yearly firm variables defined and calculated earlier. Three period averages are calculated.

1964 - 1968 Period Averages

19.11 $$X_1 = 1/5 \sum_{n=64}^{68} X_n$$

1969 - 1973 Period Averages

19.12 $$X_2 = 1/5 \sum_{n=69}^{73} X_n$$

1964 - 1973 Period Averages

19.13 $$X_{10} = 1/10 \sum_{n=64}^{73} X_n$$

19.2 Special Period Averages

For a few variables, yearly measures can be very misleading and could distort period averages as well. For these variables (all ratios) period averages are calculated first by summing the numerator and denominator for the entire period and then dividing one total by the other total. Although there are problems in adding dollars of unequal purchasing power, the advantage of obtaining a more meaningful period average is achieved. The variables for which this treatment is accorded are (for the obvious reason that the denominator or numerator can be negative, positive or zero):

The tax rate measures	(17.51 - 17.53)
The GP-L adjustment ratios	(17.91 - 17.94)
The Market Value-Earnings Ratios	(18.11 - 18.17)

20.0 Eliminating Holding Companies

Of the 330 firms that met original screening (402-72) the following firms are dropped from the analysis. These may be non-monetary accounts for which no convenient adjustment procedures are evident.

If Intangibles Too High

20.11 If $\underset{(33)}{\text{Intangibles}_n} > (.20)(\underset{(6)}{\text{Total Assets--Liabilities}_n})$

If Investment and Advances Too High

20.12 If $(\underset{(31)}{\text{Investments and Advances}_n}) + (\underset{(32)}{\text{Invest. and Adv}_n}) > (.20)(\underset{(6)}{\text{Total Assets--Liabilities}_n})$

If Investments plus Intangibles Too High

20.13 If $(\underset{(31)}{\text{Invest...}_n})+(\underset{(32)}{\text{Invest...}_n})+(\underset{(33)}{\text{Intangibles}_n})$
$> (.30)(\underset{(6)}{\text{Total Assets--Liabilities}_n})$

For some firms common equity can be very low because of previous losses, and returns on common equity may be misleading.

If SRA_n Too High

20.14 If $\underset{(16.13)}{SRA_n} > 1.00$ or If $\underset{(16.13)}{SRA_n} < -1.00$

Julie Cardner