The Association between Inflation-adjusted Accounting Income and the Behaviour of Share Prices

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by

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DECLARATION

I the undersigned hereby declare that the work contained in this dissertation is my own work and has not previously, in its entirety or in part, been submitted at any university for a degree.

Willem Rudolf Gevers 1 September 1992

OPSOMMING

In hierdie proefskrif word die verwantskap tussen inflasie-aangepaste data en die gedrag van aandeelpryse ondersoek. Die primêre doel met hierdie studie is om by te dra tot die kennis oor die gedrag van aandeelpryse, en dan meer spesifiek met betrekking tot die verwantskap tussen inflasie-rekeningkunde en die aandelemark.

In Suid-Afrika is dit nie verpligtend om inflasie-aangepaste data bekend te maak nie, en min maatskappye publiseer 'n aanvullende inkomstestaat van huidige koste. 'n Ietwat groter aantal maatskappye maak voorsiening vir inflasie in hul finansiële resultate deur hul bates te herwaardeer en addisionele waardevermindering af te skryf. Voor 1984 het 'n aantal maatskappye wat op die Johannesburgse Effektebeurs genoteer is, ook voorraad volgens die LIEU metode gewaardeer. Slegs beperkte inflasie-aangepaste data is dus beskikbaar, wat die skatting van sodanige data noodsaak.

Om die inflasie-aangepaste data te kan skat, is 'n aantal inflasie-rekeningkunde modelle ontwikkel, op grond van óf RE 201 óf ander voorstelle in die literatuur. Hierdie modelle is daarna toegepas op die finansiële resultate van genoteerde nywerheidsmaatskappye. In die eerste empiriese ondersoek wat in hierdie proefskrif vervat is, is die inflasie-aanpassings wat deur die onderskeie modelle gegenereer is, met mekaar vergelyk om te bepaal watter uniek is vir gebruik in die markverwante empiriese ondersoek wat volg. Met hierdie ondersoek is vasgestel dat RE 201 so uiteenlopend vertolk kan word dat inflasie-aanpassings wat statisties beduidend van mekaar verskil, gegenereer word.

Uit die literatuur wat bestudeer is, blyk dit dat drie verskillende navorsingsontwerpe geskik vir toepassing in die markverwante ondersoeke is. Die eerste ontwerp wat gebruik is, is die gebeurtenisstudie waarmee die effektebeurs se reaksie bepaal is op die afskaffing van die belastingvoordeel wat aan die LIEU-voorraadwaardasie gekoppel was. Die effektebeurs het gedurende die 21 weke rondom hierdie aankondiging geen betekenisvolle reaksie getoon nie. Dit maak enige afleidings oor die relatiewe doeltreffendheid van die effektebeurs onmoontlik. Daar is wel vasgestel dat die navorsingsontwerp baie sensitief vir die samestelling van die steekproef is. Dit word aanbeveel dat sorg gedra behoort te

word dat 'n bedryfsmaatskappy nie saam met sy houermaatskappy in dieselfde steekproef opgeneem word nie.

Die tweede navorsingsontwerp wat gebruik is, berus op die inkrementele inligtingsinhoud. Die inflasie-aangepaste inkomstesyfers van maatskappye wat geen aanpassings vir inflasie toon nie, bevat beperkte inkrementele inligting. Vir maatskappye wat wel inflasie-aanpassings openbaar maak, is die inflasie-aangepaste inkomstesyfer dikwels die beste beskrywende veranderlike van die residuele aandeelopbrengste, maar geen inkrementele inligting kon gevind word nie. Uit ontledings wat op 'n jaarbasis uitgevoer is, kan daar afgelei word dat die inflasie-aangepaste inkomstesyfer net so 'n goeie beskrywende veranderlike van die residuele aandeelopbrengste as die historiesekoste-inkomstesyfer is.

Die laaste navorsingsontwerp wat gebruik is, berus op die inkomstemetingsperspektief. In die algemeen is daar gevind dat die historiesekoste-inkomstesyfer volgens verwagting reageer, maar dat die inflasie-aanpassing selde enige inkomstemetingseienskappe bevat. Die enigste inflasie-rekeningkunde model wat tekens van inkomstemetingseienskappe toon, bevat ongerealiseerde houwinste op vaste bates as deel van sy regstelling. Dit kan beskou word as 'n teken dat die openbaarmaking van ongerealiseerde houwinste nuttig kan wees. Die gebrek aan betekenisvolle resultate vir RE 201 hou die moontlikheid in dat dit ontoereikend is.

In die algemeen is gevind dat die verwantskap tussen inflasie-aangepaste data en die gedrag van aandele op die effektebeurs baie swak is.

ABSTRACT

In this dissertation the association between inflation-adjusted data and the behaviour of share prices is investigated. The primary purpose of this investigation is to make a contribution to the body of knowledge regarding share price behaviour, and more specifically with respect to the relationship between inflation accounting and the share market.

The disclosure of inflation-adjusted data is not mandatory in South Africa, and few companies have disclosed supplementary current cost income statements. A somewhat larger number of companies make provision for inflation in their financial results by revaluing their assets and accounting for additional depreciation. Prior to 1984 a fair proportion of the companies listed on the Johannesburg Stock Exchange also used the LIFO method of inventory valuation. The disclosed inflation-adjusted data is very limited, necessitating the estimation of the inflation-adjusted data.

To estimate the inflation adjustments, a number of inflation accounting models were developed based either on AC 201 or other suggestions found in the literature. These models were then applied to the financial results of listed industrial companies. In the first empirical analysis contained in this dissertation the inflation adjustments generated by the various models were compared to identify unique models for further use in the market related empirical work. From this analysis it was established that AC 201 is open to such a divergent interpretation that significantly different inflation adjustments are generated.

From the literature reviewed, three research designs showed promise for application to the market related empirical analyses. The first design used was the event study which was used to evaluate the share market's reaction to the abolition of the tax benefits associated with the LIFO method of inventory valuation. The share market showed no significant reaction for a period of 21 weeks surrounding the announcement, making possible statements regarding the relative efficiency of the Johannesburg Stock Exchange impossible. It was, however, established that the research design used is very sensitive to sample formation, and it is recommended that special care should be used in market

related studies to ensure that both operating and holding companies are not included in the same sample.

The second research design used was the incremental information content design. Limited incremental information content was found in the inflation-adjusted income for companies which disclosed no inflation adjustments. For companies that did disclose some aspects of inflation accounting, the inflation-adjusted income was often the better explanatory variable of the residual share returns, but no incremental information content could be detected. Based on analyses performed on single years of data it was found that the inflation-adjusted income was as good an explanatory variable of the residual share returns as the historic cost variable.

The final research design used was the income measurement perspective. It was found that in general the historic cost income behaved as expected, but the inflation adjustment to income seldom displayed any income measuring properties. The only inflation accounting model that displayed signs of income measurement properties contained as part of its adjustment unrealised holding gains on fixed assets. This could be a indication that the disclosure of unrealised holding gains could be useful. The lack of results found for AC 201 possibly points to its inadequacy.

In general the relationship between the inflation-adjusted data and the share market was found to be very weak.

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CHAPTER ONE

INTRODUCTION AND ORGANISATION

1.1 INTRODUCTION

The question of whether and how to account for the changes in price levels in the annual financial statements of companies is a debate that has a long history. Devon and Kolodny (1978: 19) state that W. A. Paton advocated as early as 1920 the publication of both historic cost and inflation-adjusted data. When changes in general price levels increased to double figures in a number of major Western countries during the 1970's, this lead to the publication of statements of accounting practice regarding inflation accounting (Benatar & Fryer, 1987). In a number of countries these statements were made part of the Generally Accepted Accounting Practice (GAAP), which eventually lead to a considerable amount of research on the value of the data. When inflation however abated, the requirement to report inflation adjustments was removed, resulting in the decline of inflation accounting reporting.

In South Africa the situation has been different. The inflation rate as measured by the annual change in the consumer price index has been in double figures for more than 15 years (see Figure 1.1), yet there is no formal statement of generally accepted accounting practice on the topic of inflation accounting. Guideline AC 201 (formerly 4.003) of the South African Institute of Chartered Accountants, hereinafter called AC201, was published in August 1978, but was never made part of GAAP. Very few companies have disclosed information in accordance with this guideline (De Jong, 1989), and only one study on the value of inflation-adjusted data has been reported (Du Plessis, 1984).

The topic of inflation accounting has received renewed attention of late. In 1986 the South African Institute of Chartered Accountants published an exposure draft, ED66. This exposure draft was soon withdrawn, to be followed in September 1989 by a new exposure draft, ED77. Although this draft has since been withdrawn, the Institute is still working on new proposals (Singer, 1991: 167). In the mean time the Accounting Practices Board has formally adopted the IASC framework which makes specific reference to capital maintenance (Miller, 1990: 255). During an annual presentation of awards for financial reporting, the Director-General of Finance, Mr Gerhard Croeser, made a call on companies to publish inflation-adjusted income (Sake-Rapport, 1989: 1). Similar views have also been expressed on a number of occasions by the immediate past president of the Johannesburg Stock Exchange (JSE), Mr Tony Norton, amongst others at the Eighth National Congress of the South African Institute of Chartered Accountants. Jacobson (1991: 197) also argued that it is essential for companies to disclose inflation-adjusted results in their annual financial statements, while Bhana (1992: 124) has highlighted the unwillingness of South African companies to disclose information regarding the effect of inflation on their financial results.

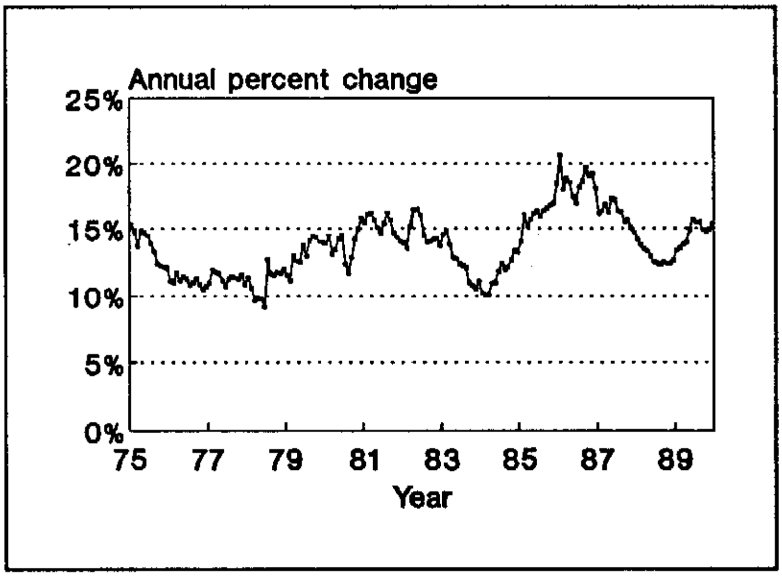

Figure 1.1: Annual percentage change in the Consumer Price Index
Source: RSA, *Bulletin of statistics*, various editions.

The primary purpose of this study is to evaluate the value of inflation-adjusted accounting income as perceived by the investors by studying the relationship between these data and the behaviour of share prices. Since the publication of inflation adjustments is not mandatory, and they are in general not disclosed voluntarily, the inflation-adjusted income has to be estimated. For this purpose a number of inflation accounting models are suggested and applied to the published data of listed industrial companies on the Johannesburg Stock Exchange.

Since it is possible that the various suggested inflation accounting models could measure basically the same phenomenon, it must first be established which of the suggested models seem to measure unique phenomena and thus warrant further investigation. This evaluation is thus a prerequisite in order to achieve the primary goal of this study.

The stock market's reaction to announcements regarding inflation accounting practice are related to the primary goal of this study and thus of secondary interest. A number of methods have been used by industrial companies to reflect the effect of inflation on some of their accounting data. The only inflation accounting practice which also had a tax, and thus a cash flow advantage, is the last-in-first-out (LIFO) method of inventory valuation. The share market's reaction to the voluntary change to LIFO inventory valuation has, however, already been investigated by Knight and Affleck-Graves (1983). The tax benefits gained by using the LIFO method of inventory valuation were, however, scrapped in the Budget of 1984. For that reason the share market's reaction to the abolition of the tax benefits associated with this inflation accounting practice is investigated.

If a relationship between inflation-adjusted accounting data and the behaviour of share prices can be established, this serves a two-fold purpose. Firstly, any such relationship will explain part of the behaviour of share prices and thus enhance the body of knowledge regarding share price behaviour. This is also the purpose of investigating the market reaction to the abolishment of the LIFO tax benefits.

Secondly, if one assumes that the stock market is efficient in its semi-strong form, share prices should reflect all publicly available information, including the effect of inflation on the accounting data. Thus by studying the relationship between inflation-adjusted accounting income, generated by various models, and the behaviour of share prices, some insight may be obtained on whether the market is using these models to evaluate the effect of inflation on the financial results of companies. This study could thus be useful in providing accountants, and more specifically, those who are working on a new draft for the financial disclosures during periods of changing price levels, information regarding the type of model they should be proposing.

1.2 DELIMITATIONS

It is not the purpose of this study to suggest the ideal method or form of accounting for the effects of changing prices. The accounting professions in many countries have debated this issue over many years and have failed to come forward with a uniform and universal solution to this problem. It is thus specifically not addressed in this study. The alternative forms of inflation adjustment investigated in this study are either based on the proposals contained in AC201, or a modification of those proposals, or what has in the literature been proposed as a simple or broad-brush approach to the problem of inflation accounting. These models are thus probably similar to the mechanisms used by the market participants to evaluate the effect of inflation on the financial results of a company.

The primary part of this study, which investigates the relationship between the inflation-adjusted accounting income and the behaviour of share prices, does not attempt to measure the impact of the voluntary disclosure of inflation-adjusted data by some of the companies. Too few companies have made such disclosures, and as a result it would not be possible to generalise from those findings to all industrial companies.

The main part of this study is also not designed as an announcement study to evaluate the market reaction to various announcements pertaining to inflation or inflation accounting deliberations.

This study is further limited to companies that are listed in the industrial section of the Johannesburg Stock Exchange, with financial years ending in the calender years from 1975 to 1989. The first year, 1975, is governed by the availability of stock market data, while the latter year, 1989, was appropriate at the inception of this study since no further data was available at that stage. A database of accounting data was at that stage prepared and all subsequent research was based on this database.

The years included in this study represent various phases of the South African economy indicated by the annual percentage change in the real Gross Domestic Product as shown in Figure 1.2. It is clear that the growth rate of the economy and hence the Gross Domestic Product increased in the years 1978 to 1980, in 1984 as well as 1986 to 1988, while the growth rate of the economy declined from 1975 to 1977, from 1980 to 1983 and in the years 1985 and 1989. In 1982, 1983 and 1985 a negative real growth rate was recorded, indicating a contracting economy.

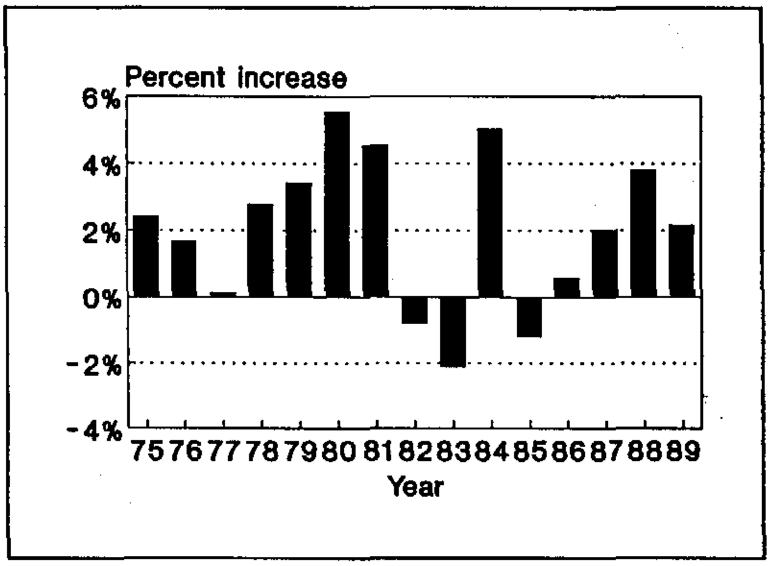

Figure 1.2: Annual percentage increase in real Gross Domestic Product
Source: South African Reserve Bank, *Quarterly Bulletin*, various editions.

It is quite clear that the eight-year period from 1981 to 1989 contains adequate variation in terms of economic growth and hence economic activity to be sufficiently exhaustive for a study of the nature that is reported here. It is for that reason that the comparison of the inflation accounting models is limited to those years only. Since Du Plessis (1984) used data from 1975 to 1982, that period is also included when the relationship between the accounting data and the behaviour of share prices is investigated. It is felt that the period over which this investigation is performed is representative enough in order to generalise from its findings.

The selection criteria for companies to be included in this study are discussed and motivated in detail in the relevant chapters.

1.3 ASSUMPTIONS

The findings of this study are subject to the following assumptions:

(a) It is assumed that the possible shortcomings in the research design as discussed in the various chapters, do no impair the research findings.

(b) The stock market is sufficiently efficient to reflect the impact of inflation on the share prices of the companies. Gheyara and Boatsman (1980: 20) argued that in an uninformed but rational market, one could expect share prices to incorporate an unbiased estimate of the inflation adjustments. It is assumed that the market participants, that is those individuals whose expectations affect a share's price (the investors and analysts), have sufficient means to evaluate what the impact of inflation on the company is going to be by using the published historic cost data as well as any other data outside the published financial statements. Since the Johannesburg Stock Exchange is dominated by a few very large investors who have sizable investment analysis sections (according to *McGregors On-line* (1992) 80,7 % of the market capitalisation of the JSE was controlled by the top four investors in 1989), this assumption does not seem to be unreasonable. It is also supported by a number of studies abroad which indicate that market participants may be producing their own information for non-reported inflation-adjusted data (Beaver, Christie & Griffin, 1980: 130; Lustgarten, 1982: 124). It is further supported by Bernard and Ruland's (1987: 710) successful attempt in estimating inflation adjustments.

(c) Homogeneity between companies is assumed. This means that market participants' reactions as reflected in the share prices, are similar for financial statements reflecting similar kinds of information. Although Bernard and Ruland (1987: 708) argue that a significant industry effect may be present and thus negate the homogeneity assumption, the South African data is too limited to include industry effects in the analysis as well.

1.4 STRUCTURE OF THIS STUDY

This study is organised in such a way that most of the chapters retain an independent character. Since the research designs for the various sections differ, it was considered to be beneficial for the overall readability to group the work in self-contained chapters. A certain amount of repetition may occur for the benefit of continuity and coherence.

Chapter Two lays the foundation for the share market related empirical research that is reported in Chapters Four, Five and Six. It contains a review of the literature regarding the association between inflation-adjusted accounting data and the behaviour of share prices. Three research designs, namely the event study, the incremental information content approach and the income measurement perspective are identified for further evaluation in this study.

In Chapter Three the inflation accounting models proposed for this study are discussed. It does not contain a comprehensive survey regarding alternative methods of inflation accounting, but various aspects of inflation accounting with specific reference to AC201 and some simple inflation accounting models are addressed. The models suggested for this study are described in detail, and are then applied to the published financial data of listed industrial companies in order to estimate inflation adjustments for all these companies. The adjustments are then tested to determine statistically whether they are different to one another or not. The models that are found to be unique will be used in the subsequent analysis.

Chapter Four evaluates the share market's reaction to the abolition of the tax benefits associated with the LIFO method of inventory valuation. Although this chapter does not deal directly with the inflation accounting models discussed in Chapter Three, it is considered to be an important link in this study. Firstly, it deals with LIFO inventory valuation which was allowed for taxation purposes up to 1984 and as such a component of inflation accounting through which companies could obtain a tax benefit. A further reason as to its importance for inclusion in this study is that by studying the share market's reaction to this announcement, some information as to the efficiency of the share market may be obtained. Since it is assumed that the share prices contain the market participants' estimation of the inflation impact on each share, this chapter can shed some light on the speed with which the effect of a public announcement like this one is impounded in the share price.

In Chapter Five the incremental information content approach is applied to the South African data for each of the unique inflation accounting models identified in Chapter Three. The incremental information content approach is used since it is the research design that has been used most widely abroad. In addition, it was the approach used in the only South African study to date (Du Plessis, 1984). That study, however, contained a number of deficiencies which are highlighted and corrected in this research. For the sake of systematic research it was thus considered essential to replicate and extend Du Plessis's (1984) study.

In Chapter Six the income measurement perspective is used to evaluate the relationship between inflation-adjusted accounting data and the behaviour of share prices. This research design was selected because it is supported by an econometrically sound relationship. In addition Haw and Lustgarten (1988) reported positive results using this design on American data. It thus seems to be the most promising research design to use.

Chapter Seven concludes this study by summarising the findings and proposing a number of recommendations.

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CHAPTER TWO

REVIEW OF THE RELATED LITERATURE

2.1 INTRODUCTION

The relationship between inflation-adjusted accounting data and the behaviour of share prices is a topic that has received considerable attention in the academic literature abroad. This is likely to be due to the disclosures that were required according to GAAP in both the United States of America (USA) and the United Kingdom (UK). The usefulness (measured as the information content) of the required disclosures has been the purpose of the majority of these studies.

In the USA the Securities Exchange Commission's (SEC) Accounting Series Release (ASR) 190 (SEC, 1976) required the publication of replacement cost information by companies meeting certain specified size criteria. This was subsequently followed by the publication of Financial Accounting Standards Board's (FASB) Statement No. 33, "Financial reporting and changing prices" in September 1979, which required the disclosure of comprehensive inflation-adjusted accounting data for an experimental period of five years (Swanson, 1983: 7). The SEC stated that "the benefits of disclosure clearly outweigh the costs of data preparation" (Watts & Zimmerman, 1980: 95), and this prompted the research regarding the value of these disclosures.

In the UK the Statement of Standard Accounting Practice (SSAP) No. 16 required the disclosure of current cost data by companies meeting certain specified size criteria from 1 January 1980 (Benatar & Fryer, 1986: 174). This was also followed by a comprehensive research project on the value of current cost accounting (Carsberg & Page, 1984). Subsequently further empirical studies have been published to evaluate the value of the required disclosures.

In South Africa Guideline AC201 (SAICA, 1978) was never made mandatory. As a result only one study that evaluated the information content of inflation-adjusted data has been published (Du Plessis, Archer & Affleck-Graves, 1986a).

After the abatement in the rate of inflation in both the USA and the UK, the requirements regarding the publication of inflation-adjusted data were removed (Singer, 1991: 164). The lower levels of inflation as well as the fact that the publication of inflation-adjusted data was no longer required, seems to have reduced the interest in research on this topic lately. Although many of the initial publications reported that the inflation-adjusted data did not contain any useful information, later publications, which utilised alternative research designs, have reported share price reactions.

In this chapter the body of research on this topic will be reviewed and classified. The purpose of most of the reported research was to determine whether inflation-adjusted data were perceived as useful by market participants. If the adjusted data was perceived to be useful, it was said to have information content. Thus the reported research deals in general with the information content of the adjusted data. Various research designs have, however, been employed to establish the information content. In the sections that follow, most of the research is classified according to the research design used. This does not necessarily imply that all the studies reviewed under a specific heading use identical research designs. They will, however, be similar in construction. The first section will deal with the early research on the topic, prior to any required disclosures. This is followed by studies dealing with the assessment of risk. The next section deals with a design which is broadly classified as portfolio comparisons. The third design reviewed is the incremental information content approach in which market model residuals or share returns are explained by using various accounting variables. The following section deals with event studies, subdivided into those studies investigating the effect of the announcement of inflation-adjusted results, those dealing with the deliberations regarding inflation accounting and those dealing with the change to LIFO inventory valuation. The next section deals with research using the accounting beta design, and this is followed by the share valuation approach. The latest designs look at the association between the accounting data and behaviour of share prices from an income measurement perspective, and at the differences in the trend of historic cost income and that of inflation-adjusted income. The last section deals with related empirical research.

The chapter will be concluded with a motivation for the research design of the empirical work that follows in Chapters Four, Five and Six.

2.2 EARLY STUDIES

In one of the first reported studies, Cutler and Westwick (1973) estimated what the impact of general purchasing power adjustments could be on the reported financial positions of listed UK companies. Using their own assessment of the inflation adjustments, they estimated adjusted price-earnings ratios, dividend covers and share prices. They did not perform any statistical tests, and came to a conclusion that equity prices should not decline as a whole. By means of this paper the authors focused, at an early stage, attention on the possible share price behaviour due to inflation adjustments. Morris (1975) evaluated the impact of the publication of the Cutler and Westwick paper on share prices using the Abnormal Performance Index (API), which as developed by Ball and Brown (1968). He found no market reaction.

Kaplan (1978) reviewed the early empirical work on accounting data and the share markets and did not mention any evidence relating to inflation accounting. In a later review, Beaver (1981: 117-141) did not comment on the point of inflation accounting and share market reaction.

2.3 RISK ASSESSMENT

In one of the first attempts to assess the effects of replacement cost data on the behaviour of share prices, Abdel-khalik and McKeown (1978: 47-77) evaluated the effect of replacement cost data on various risk measures, amongst others systematic market risk. Publicly disclosed forecasted holding gains were used to split samples into high and low impact sub-samples and the difference in the risk characteristics of the sub-samples were tested for significance. The holding gains data did not seem to have an influence on the market risk characteristics. Boatsman and Revsine (1978) were critical about some of aspects of the research design of Abdel-khalik and McKeown (1978) and contended that their results were inconclusive. Ingberman (1978: 95) confirmed Boatsman and Revsine's (1978) belief that an expectations model for the replacement cost data is required in order to evaluate the information content of disclosures.

Whereas Abdel-khalik and McKeown (1978) used replacement cost data to evaluate the effect of inflation accounting on market risk, Short (1978) used estimated price-level adjusted data. He used accounting ratios to explain the variability in the systematic market risk, beta. The accounting ratios were based on either historic cost or price-level adjusted data. Price-level adjusted ratios explained more of the variability in the betas, implying that price-level adjustments had information content. It was, however, not determined whether the increased explanatory power was significant. In addition omitted variables and measurement errors could have influenced the results. Thus Short's (1978) findings of information content were not conclusive.

2.4 PORTFOLIO COMPARISONS

Some of the research designs used to investigate the relationship between inflation-adjusted data and the behaviour of share prices used the difference between portfolios. Since these designs are sometimes difficult to classify, they have been grouped together in this section.

Ro (1980) matched companies which had to disclose replacement cost data with companies that were exempt from the disclosures. The differences in the accounting data of the two companies were treated as an independent variable. His sample was subdivided into good-news and bad-news sub-samples. The difference between the cumulative abnormal market returns of these two sub-samples was tested for significance over various periods which included the disclosure date. His results indicated no evidence of information content in the replacement cost data. Apart from the insufficient controls for unexpected historic cost data recognised by Ro (1980) himself, it is doubtful whether the dependent sample difference statistic was the correct one to use.

The negative relationship between share returns and inflation has been documented amongst others by Fama and Schwert (1977). McDonald and Morris (1984) used inflation accounting disclosures to classify companies according to inflation sensitivity. The share returns of portfolios of high and low sensitivity companies were then compared to determine whether they behaved differently to the disclosure of the consumer price index. Since no difference in the behaviour of the portfolios could be established, it was concluded that the inflation accounting disclosures contained no information. Using a similar design, Cheung (1986) found similar results for Canadian companies.

Under the premise that current cost income should be a better indicator of a company's dividend-paying ability, Schaefer (1984) constructed portfolios using dividend as well as current cost signals. He found that once the dividends and historic cost income have been taken into account, the information content of current cost income disappeared.

Matolcsy (1984) constructed portfolios of high, medium and low unexpected historic cost income which he then subdivided into sub-portfolios of high and low unexpected inflation-adjusted income using estimated inflation-adjusted data for Australian companies. The portfolio returns were compared with a control portfolio using the Hotelling T^2 statistic. No incremental information content could be found in the inflation-adjusted accounting data.

In a South African context, Du Plessis and Archer (1983) compared the performance of portfolios which were constructed according to an estimated inflation impact. They found that low impact portfolios outperformed higher impact portfolios over a period of six years. Their significance testing was, however, suspect since they tested accumulated quarterly returns for significant differences rather than the quarterly returns themselves, nor did they use any controls for other factors such as market beta.

A number of the reported studies attempted to elicit the information content of inflation-adjusted data by constructing portfolios using an inflation sensitivity measure which was based on the adjusted data. Inflation sensitivity can, however, to a large extent be evaluated by the market participants without the need for disclosed adjusted data. It is known that companies with high levels of fixed assets, inventory and net monetary working capital are more prone to inflation than companies that have lower levels of these asset categories. Thus, failure to find significant differences between such portfolio is not a test for the information content of the disclosures. The information content of a disclosure is not contained in the absolute value of the number disclosed, but rather in the unexpected part.

2.5 INCREMENTAL INFORMATION CONTENT

2.5.1 Description

Probably the largest body of reported research used some form of testing for the incremental information content of inflation-adjusted data. When this research design is used, market model residuals are determined and accumulated for a specific period. The cumulative abnormal returns are then used as the dependent variable in a multiple linear regression equation in which, amongst others, inflation-adjusted accounting data are used as independent variables. In an alternative design, the cumulative abnormal returns are replaced by share returns over the same period. If the inflation-adjusted data display coefficients which are significantly different from zero, the data contain incremental information.

In some of the earlier work on incremental information content, multiple linear regressions were not used. Rather, the individual observations were cross-tabulated according to high and low, or positive and negative effects of unexpected changes in accounting data and cumulative abnormal residuals. The cross-tabulated observations were then tested for statistical significance using a nonparametric test. The advantage of this type of design was the robustness since no assumptions were made regarding the error term of the multiple regression equation (independent, normally distributed and of constant variance). If statistical significance could be established using this type of design, it could be seen as a strong indication of incremental information content. On the other hand, a considerable amount of detail available in the data was discarded since it was treated in an ordinal fashion. Thus if the hypothesis of incremental information content was not rejected, it could well be that the test was not powerful enough to distinguish the incremental information content.

2.5.2 Residual returns

Hillison (1979) used estimated general purchasing power adjustments to evaluate the effect of inflation on the earnings per share. Using the cross-tabulated design, he could find no incremental information content in the adjusted earnings per share.

Using multiple linear regression analysis, Lustgarten (1982) was the first to report incremental information content for some replacement cost variables. To test the robustness of his findings, he used various deflators for the accounting data. In addition he tested for heteroscedasticity and found that his results held under a weighted least squares regression. Freeman (1983) found an association between current cost measures and residual share returns for certain industries, but lacked sufficient data to apply his methods to firm-specific current cost data.

In a thorough replication of Beaver, Griffin and Landsman's (1982) research which they also extended considerably, Bublitz, Frecka and McKeown (1985) found that replacement cost accounting data reported in accordance with FASB Statement No. 33 contained incremental information content. These findings held over all years of their investigation, as well as various definitions of the replacement cost variables. Industry effects which could have caused cross-sectional dependence were also taken into account.

Hopwood and Schaefer (1989) argued that firms differ in their ability to respond to cost changes and thus split their sample on a cost response measure. The normal regression parameters were estimated for both groups and were then compared. They found incremental information content in the total current cost variable (which included holding gains) which was obscured if the firms were not grouped according to their ability to pass on cost increases.

The incremental information content design has also been used in research conducted on non-USA data. In the initial investigations regarding the usefulness of current cost disclosures reported under SSAP No. 16 in the UK, Board and Walker (1984a; 1984b) used the cross-tabulation approach and found no incremental information in current cost earnings data nor in holding gains. In subsequent research they found that the multiple regression approach did not change their conclusion of no incremental information content (Board & Walker, 1985).

Matolcsy (1986) did not address the issue of inflation accounting directly, but his research based on Australian data did provide some additional insights. Instead of using current cost income, the individual micro effects of inflation on the share performance of companies were evaluated. These micro effects were the tax shield losses or gains due to the difference between charges under historic cost accounting procedures and what Matolcsy (1986: 362) called economic costs. Economic costs were estimated using procedures consistent with general purchase price adjustments. The micro effects were thus merely the individual components of inflation accounting multiplied by a constant. The regression analysis did not indicate any incremental information content in the components of the inflation-adjusted data.

The only published South African study to date (Du Plessis, *et al.*, 1986a) was based on Du Plessis's (1984) research. They found that estimated inflation-adjusted accounting income did not have incremental explanatory power over the historic cost counterparts except where companies were severely affected by inflation.

2.5.3 Share returns

Prior to the availability of disclosed current cost data, Easman, Falkenstein and Weil (1979) used a time-series regression per company to analyse the relationship between historic cost income and annual share returns as well as between estimated current cost income and the share returns. They found that the current cost data displayed higher correlation coefficients than the historic cost data. Although this research can at best be described as exploratory, it prompted further research.

Beaver, Griffin and Landsman (1982; 1983) used the cross-sectional multiple linear regression approach and found that replacement cost data did not contain incremental information. This finding stood firm for various definitions of income. In order to control for the collinearity of the explanatory variables, namely percentage changes in historic cost income and in replacement cost income, they employed a two-stage regression approach. Although Christie, Kennelly, King and Schaefer (1984) showed that their two-stage regression did not alleviate the problem of collinearity, the results on the incremental information content stood (Beaver, Griffin & Landsman, 1984). They also established that the historic cost income contained incremental information over the replacement cost income. As a result they maintained that the inflation-adjusted income were but a garbled version of the historic cost income. Subsequently Beaver and Ryan (1985) repeated the regressions for disclosed FASB Statement No. 33 data and found no incremental information content in the inflation-adjusted data. They summarised the implications of their findings as follows (Beaver & Ryan, 1985: 70): "It is important to state what these results do not imply, however. They do not imply that it is unimportant to make adjustments for inflation in an analysis of security price. They do not imply that analysts are not making adjustments for inflation in their analysis. They do imply that, if the adjustments are being made, either Statement No. 33 data are not capturing that adjustment process very well or the magnitude of the adjustment is small."

In a slightly different construction of their regression equation, Morris and McDonald (1982) used Beaver, *et al.*'s (1982) two-stage regression approach in an attempt to explain the variability of the share return by using the market beta and an inflation sensitivity variable as the explanatory variables. Their inflation sensitivity variable was nothing but an unexpected inflation-adjusted income in which the expectation was modelled by the historic cost income. Provision was made for the fact that beta was calculated using share returns. Contrary to other research findings, they concluded that inflation-adjusted data were impounded into share prices.

Murdoch (1986) addressed the problem of cross-sectional dependence by using a matched pair design. Evaluating various definitions of inflation-adjusted income, he found that general purchasing power adjusted returns possessed incremental information content in explaining share returns.

Whereas the previously mentioned research dealt with the problem of incremental information content using cross-sectional regressions, Bernard and Ruland (1987) extended the body of research by performing time-series regressions. In order to obtain sufficient current cost data for this type of analysis, these data had to be estimated. Data was aggregated over industries and it was determined that for some industries the current cost income contained incremental information over that contained in the historic cost income.

In the UK Peasnell, Skerratt and Ward (1987) replicated the Beaver, *et al.* (1982) study on data disclosed under the provisions of SSAP No. 16 and found similar results, namely that the current cost income did not contain incremental information content.

2.6 EVENT STUDIES

2.6.1 Description

In event studies the share market's reaction to announcements is investigated by testing the share residual returns for significance during periods surrounding the announcement date. In early studies these periods were months, but it is more usual to find weekly or even daily periods being used. An alternative method used is the partitioned portfolio methodology in which a number of portfolios are constructed that are ideally identical except for possible reaction to the data which is to be disclosed. Portfolio residual share returns for a period surrounding the announcement date are then tested for equality.

In terms of inflation accounting a number of events are of importance. An obvious event was the date of disclosure of inflation-adjusted results where these disclosures were required according to GAAP. Another series of events of importance were the public announcements regarding inflation accounting itself. Depending on the severity of the impact of inflation on their accounting data, the share prices of companies could have behaved differently on the announcements regarding the requirements for disclosure. Although these studies regarding accounting deliberations did not necessarily convey information about the value of inflation accounting, they are of associated interest. A further event that has lead to a fair amount of share market research was the announcement by companies of a voluntary change from the first-in-first-out (FIFO) to the last-in-first-out (LIFO) method of inventory valuation. If a company used the LIFO method of inventory valuation, its cost of goods sold was valued at replacement cost. By disclosing this aspect of inflation accounting, reported income is reduced, leading to a lower tax burden and the resultant beneficial effect on cash flow. A final type of event study dealt with the disclosure on a regular basis of the inflation rate itself. Where the disclosure of inflation indices was not linked to inflation accounting, these studies will not be mentioned.

2.6.2 Disclosure of inflation-adjusted results

The first two event studies published, evaluated the share market's reaction to the replacement cost disclosures required under the SEC's ASR 190 (Gheyara & Boatsman, 1980; Beaver, Christie & Griffin, 1980). Gheyara and Boatsman (1980) used four different tests, three of which used matched pair designs. Not one of the tests indicated any abnormal price behaviour around the day on which the 10-K reports containing the relevant data were filed. Beaver, ***et al.*** (1980) used the partitioned portfolio methodology and compared the portfolio residual share returns over three different periods. None of their tests could establish any information content.

The research design used by Lobo and Song (1989) exploited the difference in timing between the disclosure of historic cost income and of SFAS No. 33 income and also controlled for industry effects. They found that both constant dollar operating income as well as current cost income contained incremental information over historic cost income and its cash and accrual components. The results were, however, only significant for a number of industries.

A number of studies have referred to the disclosures under SSAP No. 16 in the UK. Appleyard and Strong (1984) used the partitioned portfolio approach also used by Beaver, *et al.* (1980) around the first disclosures of current cost accounting and like Beaver, *et al.* (1980) they found no information content. Skerratt and Thompson (1984) used the incremental information content design to test for market reaction to the disclosure of current cost information. Instead of using an annual cumulative abnormal return as dependent variable, they used the cumulative abnormal return over a few days around the disclosures. Periods of different length and different starting days were used. They found that the current cost disclosures contained incremental information approximately 10 days prior to disclosure. Peasnell, *et al.* (1987) expanded on this research and found significant information content in the current cost data up to 35 days prior to disclosure.

Brayshaw and Miro (1985) constructed two matched portfolios, of which only one disclosed current cost data according to the Hyde Guidelines voluntarily. Weekly cumulative abnormal returns around the date of disclosure did not indicate any information content in the disclosures. Using mandatorily disclosed UK current cost data, Peasnell, *et al.* (1987) analysed the daily abnormal performance index of a sample of companies and found that if the historic cost data contained good news, the market distinguished further between securities on the basis of current cost.

2.6.3 Inflation accounting deliberations

Ro (1980) maintained that if the costs of complying with SEC ASR 190 were high enough, a difference in share price performance should be observed on the days that announcements regarding ASR 190 were made. In a matched pair portfolio design he could not detect any abnormal behaviour. In subsequent research (Ro, 1981) he contended that if the market perceived replacement cost data to be useful, the market would respond leading to adjustments in portfolios which could possibly be detected by increased trading volume. Again using a matched pair portfolio design, he investigated trading volumes in nine different weeks, including the week of the first actual disclosures. No indication of abnormal trading volumes could be detected. Since increased trading volume is but one possible reaction to the replacement cost disclosures, this finding did not necessarily imply that the replacement cost disclosures had no influence on the market.

Noreen and Sepe (1981) developed a methodology to capture the effect of announcements on the share market using the correlation of a sample's abnormal returns in one month with the abnormal returns in another month. They detected unusual behaviour in the share market for a sample of companies affected by the announcement in the months surrounding the announcement. Basu (1981) criticised Noreen & Sepe's (1981) methodology and suggested and applied alternative methods which could not establish the same unusual behaviour. In an award winning paper Sepe (1982) developed yet another methodology and found that the share market reacted significantly to the FASB's proposals regarding general price-level adjusted disclosures.

2.6.4 Voluntary change to LIFO

The voluntary change to the LIFO method of inventory valuation has been studied in a number of different research designs. Sunder (1973) reported that LIFO adopters displayed positive residual returns, but his results were not tested for significance. Biddle and Lindahl (1982) found a positive association between residual share returns and the LIFO tax savings. Murray (1983) compared the residual returns of a sample of LIFO adopters with the residual returns of a number of control groups and established that the LIFO sample only outperformed a random control sample, but not any matched control sample. Stevenson (1987) refined Biddle and Lindahl's (1982) research and continued to find a significant positive association between the residual returns and the LIFO tax saving.

Negative share market reaction has also been reported. Brown (1980) found positive residual returns for his random control group and a negative correlation (albeit not significant) between the residual return and effects of the LIFO adoption for his change group. Ricks (1982) used a matched pair control group and found that the LIFO sample displayed significantly lower security returns than the control group. More recently Biddle and Ricks (1988) found that the results of Ricks (1982) were limited to firms that changed to LIFO in 1974 only and that the negative reaction that Ricks (1982) found was due to incorrect earnings forecasts.

Leong, Zaima and Buchman (1991) evaluated whether the ownership status of a company had an influence on the share market's reaction to the adoption of the LIFO inventory valuation. They concluded that the market did not react positively when management controlled companies announced the use of the LIFO method of inventory valuation, but it did react positively for so-called outside owner-controlled companies.

In South Africa Knight and Affleck-Graves (1983) and Knight, Affleck-Graves and Hamman (1985) evaluated the cumulative average residual returns of a sample of LIFO adopters, a control sample and a sample of flip-flop companies (flip-flop companies were listed holding companies that reported on a FIFO basis, while their subsidiaries reported on a LIFO basis). They found a substantial negative impact on the share returns of the LIFO adopters, but did not perform any statistical tests.

2.7 ACCOUNTING BETAS

The accounting beta methodology uses a two-stage procedure. In the first stage various risk measures are determined for the companies in the sample. These risk measures are the systematic market risk based on the market model, and various accounting betas which are calculated by performing time-series regressions for each company on some accounting variable regressed against a market-wide index of that variable. In the second stage the correlation between the market beta the various accounting betas is investigated. If the same variable definition is used and the only difference between two accounting betas is the fact that one is based on historic cost data while the other is based on inflation-adjusted data, and the correlation of the market beta with the inflation-adjusted accounting beta is significantly higher than the correlation with the historic cost accounting beta, it can be deducted that the inflation-adjusted data contains incremental information.

Baran, Lakonishok and Ofer (1980) compared betas generated from general price-level adjusted income with those generated from historic cost income and found that the inflation-adjusted data contained information not included in the historic cost data. Samuelson and Murdoch (1985) showed that the statistical test used by Baran, ***et al.*** (1980) was incorrect and by using an alternative test found significance for some, but not all of the inflation-adjusted accounting betas. It seemed as if the number that Baran, ***et al.*** (1980) used to deflate their accounting data could have caused the significant association: when market value based deflators were used, the relationship was significant, but if the deflator was not based on a market value, the relationship was not significant. The issue of finding a suitable deflator of accounting variables thus needs more attention.

Nunthirapakorn and Millar (1987) extended the research of Baran, ***et al.*** (1980) by including 30 income definitions, including current cost as well as constant dollar definitions. Using comprehensive tests for the equality of correlations, they came to the conclusion that the ability of historic cost data to explain systematic risk was equal to or greater than that of inflation-adjusted data.

In a South African context, Retief, Affleck-Graves, Archer and Hamman (1985) regressed accounting betas based on historic cost against market betas for portfolios of high and low inflation impact. The inflation impact measure was based on AC201. Due to very small samples no highly significant relationships could be found, but a change in the sign of the relationship was observed between the two types of inflation impact. No conclusions were made with respect to inflation accounting.

2.8 VALUATION APPROACH

Most of the research reviewed used some form of return measure for the market variable. Share returns have often been used, as have market model residual returns. When the valuation approach is used, the variable representing the share market behaviour is a company's share price on a particular date. Sometimes a theoretical framework is provided to identify factors used in the valuation process to determine a share's price. Significance testing of these factors takes place in a multiple linear regression analysis.

Morris and McDonald (1986) developed a valuation model based on economic reasoning. They then used this model with as dependent variable the share price prior to the disclosure of the financial results. Neither current cost nor constant dollar data seemed to have been used in the share valuation process, but historic cost data made a significant contribution to the valuation process.

In the UK Page (1984) used the incremental information content design, but instead of using share returns as the dependent variable, he used the share price as dependent variable and as independent variables the retained earnings under both historic cost accounting and current cost accounting. He concluded that the current cost data did have incremental explanatory power over historic cost data, but it seemed to be industry dependent. Darnell and Skerratt (1989) extended this research and paid particular attention to the violation of the homoscedasticity assumption of ordinary least squares regression. They also found that the current cost data contained incremental information.

2.9 INCOME MEASUREMENT PERSPECTIVE

The rationale behind the income measurement perspective is that if markets exist for all of the assets of a company and the value of all assets were recorded, the value of the company reported on the balance sheet under current cost accounting would equal the market value of the company's shares. Under those circumstances, the return on the company's shares (capital appreciation and dividends) should be equal to the current cost income plus holding gains. Although the share return is the dependent variable in this design, the research design is classified as a separate design since the independent variables are determined using sound economic reasoning.

Haw and Lustgarten (1988) used the income measurement perspective and also paid particular attention to the problem of heteroscedasticity. They found that all their independent variables, including the inflation adjustment variables, conformed to prior expectations with respect to sign and significance. This was viewed as a necessary, but not sufficient, condition for the inflation accounting disclosures to contain useful information.

2.10 TREND DIFFERENCES

In the latest reported research on the relationship between share prices and inflation-adjusted accounting income, Thorne (1991) concentrated on the trend between historic cost data and current cost data. He asserted that the market does not necessarily find useful information in the difference between historic cost data and current cost data which are disclosed contemporaneously. The trend of a company's current cost income relative to its historic cost income might, however, provide useful information. Using a cumulative abnormal residual measure, he found differences in the trends, which he claimed to be indicative of information content in the SFAS No. 33 disclosures.

2.11 NON-MARKET RELATED STUDIES

The value of inflation-adjusted accounting data cannot only be determined by share market related research. There are potentially many areas of business activity where the use of inflation-adjusted accounting data could prove to be superior to the use of the equivalent historic cost accounting data. In addition the usefulness of inflation-adjusted accounting data could be determined by a survey of potential users of these data. Although various issues will be highlighted below, the list does not claim to be exhaustive.

A number of surveys on the usefulness of inflation-adjusted data have been reported. Estes (1968) found that financial analysts, loan officers and financial executives considered the concepts of adjusted data very useful. Norby (1983) established that active users of adjusted data were few, a view that was by and large supported in a survey by Arthur Young & Company (Berliner, 1983) and one by McCaslin and Stanga (1983). It was also found that current cost accounting was preferable over constant dollar reporting. Steele and Hayworth (1986) surveyed auditors in the UK and reported that enthusiasm about the current cost disclosure was varied, and that the core of the auditor's dilemma was to give a 'true and fair' opinion on two different financial statements in the same annual report. In research which cannot be strictly classified as a survey, but rather a laboratory experiment, Duncan and Moores (1988) found that current cost information was perceived to be more relevant and reliable than historic cost data.

Another area of interest is the comparison of company performance measurement using the historic and adjusted data. Ashton (1985) compared various performance measures based on disclosed UK data and found a high degree of association between adjusted and unadjusted income measures as well as ratios used for internal performance measurement. Current cost data, he claimed, might be of more interest to external users. Similar research based on USA data indicated that adjusted data contained additional dimensions not contained in the unadjusted data (Smith & Anderson, 1986). From an investors' perspective, Callard and Kleinman (1985) compared Q-ratios (market value divided by book value) as a proxy for the market valuation of companies with their return on investment (ROI). Both properties were measured according to either historic cost data or inflation-adjusted data. The correlations between the inflation-adjusted ROI and Q were considerably higher and more consistent than those based on historic cost data. Unfortunately the differences found were not tested for significance, but the value of current cost data in the investors' environment was revealed.

In financial decision making it is possible that the use of inflation-adjusted data could lead to better decisions. Bar-Yosef and Lev (1983) found that adjusted data did not contain incremental information over unadjusted data in identifying dividend changes. Similar findings using South African data have also been reported (Du Plessis, Archer & Affleck-

Graves, 1986b). The prediction of corporate failure based on adjusted data has also received a fair amount of attention. Mensah (1983) evaluated USA data, Keasey and Watson (1986) used UK data while Skogsvik (1990) used Swedish data and they all came to similar conclusions, namely that historic cost data and inflation-adjusted data behave almost identically, with perhaps a weak preference for inflation-adjusted data. Bartley and Boardman (1990) used adjusted data in order to predict corporate takeovers and established that models based on a combination of inflation-adjusted data and historic cost data were more accurate than models based on historic cost data only.

2.12 A MOTIVATION FOR THE RESEARCH DESIGNS USED

The availability of suitable South African data will to a large extent determine the type of study that can be performed in this dissertation. The fact that inflation-adjusted data will have to be estimated for the different models makes any type of study using specifically disclosed data or using disclosure dates impossible. The incremental information content design is not that attractive in an econometric sense since there is no economic rationale in the construction of the model, but the fact that the only previous research in South Africa used this design makes it attractive for the purpose of replication and extension. Ideally one would like to use a research design which has exhibited discriminating abilities on the data sets used. In addition, it is desirable that the design also has an economic rationale. For this purpose the income measurement design is attractive. Haw and Lustgarten (1988) not only supplied an economic interpretation of their model, but they also found positive discriminating power.

Although Short (1978) used estimated inflation-adjusted data in describing the systematic risk of companies, it is felt that the risk assessment research design is flawed since company specific risk (that part of the risk that can be diversified away in portfolio design) is ignored, while inflation adjustments could have a bearing on that component of risk. In addition the variability and possible non-stationarity of beta is ignored.

Portfolio comparison as a research design also has its shortcomings. The limited size of the Johannesburg Stock Exchange will make the construction of matched pair portfolios very difficult. Furthermore, the dilemma of expectations in the construction of an inflation sensitivity measure is problematic. The use of nonparametric statistical tests which are not as strong as parametric tests also detracts from this research design.

The event study design could possibly be used to evaluate the share market's reaction to inflation accounting disclosures, but with difficulty since no data is disclosed mandatorily. Those 18 companies (De Jong, 1989: 10-13) that have disclosed current cost data voluntarily constitute too small a sample to use to make industry-wide deductions and inherently contain a self-selection bias. In addition they do not disclose inflation-adjusted data generated under different viewpoints regarding the construction of inflation accounting models. The event study design does, however, seem attractive to evaluate the share market's reaction to the abolition of the LIFO tax benefits.

The accounting beta design is not attractive since it requires companies with a continuous track record over an extended period. The design automatically suffers from a survival bias and the possible non-stationarity of beta. The valuation approach has merits if it founded on an economic rationale like in Morris and McDonald (1986). The particular share price used in the analysis should then be based on a disclosure date. If the share price is merely the dependent variable in a multiple linear regression, the design of this variable has a built-in dependency on the previous price. If a naive expectations model is used for the share price, the price variable becomes the difference between two share prices, which in turn is a share return measure (excluding the dividend).

From the above motivation, it is clear that the event study design is favoured to evaluate the share market's reaction to an event associated with inflation accounting, namely the abolition of the LIFO tax benefits. That part of this study is described in detail in Chapter Four.

In addition it is clear that the incremental information content approach and the income measurement perspective are favoured for the analysis regarding the association between the inflation-adjusted income and the share price behaviour. It must be emphasised at this stage that in all the reported research, estimated inflation adjustments were used in nine studies, and only Bernard and Ruland (1987) (who estimated some of their data) found that the inflation-adjusted income contained significant information content, but then only for specific industries. Unfortunately the lack of mandatorily disclosed inflation-adjusted data in South Africa necessitates the use of estimated data. The use of various models in estimating the inflation adjustments could, however, elicit some information from the share market.

Critical issues in the research design such as the collinearity of variables, cross-sectional dependence and the choice of deflators, which is linked to the problem of heteroscedasticity, are discussed in more detail in the chapters where the empirical work is addressed. The incremental information content approach as used in this thesis is discussed in Chapter Five, while the income measurement perspective is described in Chapter Six.

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CHAPTER THREE

THE INFLATION ACCOUNTING MODELS

3.1 INTRODUCTION

In this chapter various models of inflation accounting are described. The models are then applied to the financial results, as published in the annual reports, of industrial companies listed on the Johannesburg Stock Exchange. The inflation adjustments of the various models are compared to determine whether they in fact differ significantly. If some of the models lead to adjustments that do not differ in substance, it will not be necessary to evaluate the relationship between the adjustments generated by all the models and the share market variables. Only those models that seem to generate significantly different inflation adjustments will be used in the tests for association with the share market variables in Châpters Five and Six.

A company's dividend decision is a management decision. By studying the inflation-adjusted, or real dividend covers, one could glean some information on how the companies are managed during periods of a continued high inflation rate. The inflation accounting models developed in this chapter by no means claim to be an exhaustive set of models. It will be shown that at least one of the models developed generates inflation adjustments that could be regarded as optimistic, that is, actual inflation adjustments are not likely to be less than those estimated by this particular model. If under such an optimistic model a large number of companies do not maintain a real dividend cover, it could be an indication that management are not fully aware of the effect of inflation on the financial performance of their companies. The inflation-adjusted, or real dividend covers resulting from the use of the models are thus determined and examined to investigate how the industrial companies have been reacting to the continued high inflation rate.

The following section provides a brief overview of inflation accounting adjustments, while the models and data are described in detail in Section 3.3. The results are discussed in

Section 3.4 and this is followed by a number of concluding remarks in Section 3.5.

3.2 REVIEW OF RELATED LITERATURE

It is not the purpose of this research to give a critical analysis of what constitutes a good model of inflation accounting. Many authors have reviewed the accounting practices in various countries. Hamman, Joubert and Redelinghuys (1977) provided a South African perspective on the various methods of inflation accounting prior to any required disclosure abroad. Archer (1980) reviewed the practices in the Netherlands, United States of America (USA) and the United Kingdom (UK) before he performed a comprehensive analysis of the then just published Guideline 4.003, which was later renamed AC201. Sale and Scapens (1980) performed a detailed comparison of the American and British standards (FAS No. 33 and SSAP No. 16); Rosenfield (1981) reviewed the development of these accounting standards while Taylor (1982) also compared Australia's and New Zealand's proposed standards with the American and British models. More recently Benatar and Fryer (1986) gave a brief review of inflation accounting practices in eight countries.

The English-speaking countries in the world have all followed similar patterns in the development of inflation accounting standards or guidelines. In the initial deliberations general purchasing power (GPP) or also called constant purchasing power (CPP) adjustments featured strongly. These were later discarded in favour of current cost accounting (CCA) adjustments. In the USA both CCA and CPP adjustments were initially required, but the requirement to disclose CPP information was set aside in 1984 (Benatar & Fryer, 1986: 174).

In using the CPP method of adjusting accounting data for inflation, the principle of restating all the accounting data in terms of the monetary unit at a particular date is used. Under CCA the emphasis of the adjustments are focused on the income statement. Instead of charging the income statement with historic costs, the charges are calculated using current or replacement costs. This generally leads to a number of adjustments of which two, namely the cost of sales adjustment and the additional depreciation adjustment, were fairly uniformly required in the various standards and guidelines (Taylor, 1982: 132). These two adjustments are merely the realised holding gains from holding the specific assets (inventory and fixed assets). In the USA the disclosure of unrealised holding gains, that is the increase (or decease) in the current cost of land and buildings, other fixed assets as well as inventory was also required (Swanson, 1983: 10). In addition the standards and guidelines differed on the treatment of monetary items and gearing adjustments (Taylor, 1982:132). In the USA no gearing adjustment was required, but the disclosure of purchasing power gains or losses on net monetary items was required. In the UK a net monetary working capital adjustment based on a specific price index was required. In addition a gearing adjustment that represented a calculation to determine which part of the total current cost adjustment was attributable to ordinary shareholders was needed (Taylor, 1982: 132). The South African Guideline AC201 (SAICA, 1978) required an adjustment for monetary assets if these exceeded monetary liabilities, or alternatively a gearing adjustment.

With the reduction of the inflation rate in the United States of America (USA) and the United Kingdom (UK) in the early 1980's, the number of companies that complied with the standards declined, and by the late 1980's interest in inflation accounting seemed to have waned. It seemed as if 1985 was a year of reflection. Steele (1985a) gave a detailed exposition of the principles involved in current cost accounting as modelled in SSAP 16, while Tweedie and Whittington (1985a; 1985b; and 1985c) highlighted the different perspectives and resulting dilemmas involved in finding a suitable inflation accounting standard. Baxter (1985) compared CCA and CPP and concluded that some form of mixture of the two approaches was desirable. Since then the official standards on inflation accounting in both the USA and the UK have either been withdrawn or made voluntary.

In South Africa AC201 has not found wide acceptance (De Jong, 1989), although high inflation rates have not abated. ED66 (SAICA, 1986) seemed almost to have been ignored. ED77 (SAICA, 1989) also had a brief life. It was awaited with considerable expectation and hailed as a world first (*Financial Mail*, 1989) but received a mixed reaction (Singer, 1991: 167). It did away with the gearing adjustment of AC201, recognised the fact that during times of inflation assets usually increased in value, and allowed for the maintenance of shareholders' funds using a general price index. The calculations required to determine the value changes of assets and liabilities did, however, seem quite cumbersome. This draft was subsequently withdrawn and it was reported that the South African Institute of Chartered Accountants were working on a new proposal (Singer, 1991).

The arbitrary nature of certain accounting rules as highlighted by Steele (1985a) and the fact that Bernard and Ruland (1987) found that they could estimate company specific inflation adjustments using publicly available indices, probably points to the use of a simplified approach to inflation accounting, rather than a more complex method. This viewpoint is shared by Tweedie (1984).

Comparative studies of different models of inflation accounting are almost non-existent, probably because company specific information is used in determining the total adjustments. Lemke and Powell (1986) did, however, compare alternative models of the gearing adjustment and found that they did differ significantly. They then advocated the use of a uniform approach to the gearing adjustment.

3.3 THE DATA AND ITS TREATMENT

3.3.1 Period and companies investigated

The state of the economy usually has a bearing on the overall performance of companies. To determine a period for this investigation, it was decided to include both periods of economic growth and decline. The real growth in Gross Domestic Product in South Africa, as reported in the Bulletin of Statistics (RSA, 1988: 14.2; RSA, 1990: 14.2) over an extended period was shown in Figure 1.2 in Chapter One. From 1982 onwards there were periods of decline (such as 1983 with an decrease of 2,1%, and again in 1985 with a decrease of 0,4%) as well as periods of fairly rapid growth (such as 1984 with an increase of 5,0%). It was thus decided to perform the analysis for the years 1982 to 1989 inclusive.

The investigation was limited to companies listed in the industrial section on the Johannesburg Stock Exchange (JSE).

The University of Stellenbosch Business School maintains a database of accounting information of industrial companies listed on the JSE. All the companies are contacted on a regular basis, either via their transfer registrars or directly, with a request to provide the Business School with copies of their published annual reports. Although it has not been possible obtain all the annual reports of all companies, about 85% of all companies over time did provide the necessary documents. In terms of market capitalisation these companies represented almost the full industrial section of the JSE.

For the analysis contained in this chapter, it was decided to exclude the following companies:

(a) Foreign companies that have their head office outside South Africa. The tax structure for these companies can differ from those registered in South Africa, and they can be affected differently by foreign economic influences.

(b) Investment companies. These companies hold as their main assets investments in other companies. They do not display the normal characteristics of an industrial company, namely fixed assets, inventory, debtors and creditors. The balance sheets of such companies are usually so sparse that inflation adjustments are difficult to determine.

(c) All pyramid holding companies. If the holding company holds more than 50% of the issued ordinary share capital of the operating company, the holding company's income statement and balance sheet are often identical to those of the operating company due to consolidated reporting. The importance of this exclusion is borne out by the findings of this research as reported in Chapter Four, Section 4.4 where it was established that the inclusion of both the operating company and its holding company in a sample could affect the statistical significance in an event study. Although the research documented in this chapter does not constitute an event study, the possibility of confounding the results due to double counting by the inclusion of both the holding company and the operating company does exist. Pyramid holding companies were located by perusing the "Nature of Business" and "Holding Company" sections for each company as published in various editions of the *Stock Exchange Handbook.*

(d) If a company changed its reporting date, resulting in either a reporting period of shorter or longer than a full calendar year, that particular year for that company was excluded from the data. Since inflation adjustments are not only dependent on opening and closing balance sheet data, but also on income statement data, it seems better to omit those company-years which do not constitute a full year rather than to adjust the income statement data to represent a full year's activity.

(e) Companies for which only one annual report was available were excluded from this study. Since opening and closing balance sheet data are required to determine the inflation adjustments, ideally two annual reports are required. Although one could possibly extract the immediately preceding year's data from an annual report, the notes to the previous statement were sometimes not provided in sufficient detail. For this purpose data is usually only extracted from the current year's annual report.

The sample of companies thus included companies that were only listed for a part of the period under investigation. In previous studies (Gevers & Hamman, 1988; Gevers, 1988) only companies that were listed continuously for a five-year period were considered. That approach could have had a bias towards the older, more established companies. That possible bias is eliminated by the research design in this chapter.

3.3.2 Standardised database of accounting data

The University of Stellenbosch Business School (USB) has at its disposal a comprehensive database of both income statement and balance sheet data which have been extracted from the published annual reports of industrial companies listed on the JSE. Since the accounting standards allow a little flexibility in the method of reporting these data, it was necessary to standardise these data before they were incorporated in the database. It was usually possible to extract sufficient information from the notes to the statements in order to reconstruct the standardised accounting data. The result of this standardisation process was that income and other accounting data were comparable between the various companies.

The method of standardisation will not be discussed further. The database, however, contains considerably more accounting information than that which was publicly available through a source like *McGregors On-line*. The *McGregors On-line* database is not standardised, and contains at most five years of data. The additional information in the USB database over and above that contained in the *McGregors On-line* database was essential in order to estimate the inflation adjustments for a number of the inflation accounting models used in this dissertation.

When a non-commercial database like the USB database is used in research, questions may arise as to the accuracy of the data contained in the database. It is known, however, that this particular database has been used for research in a number of published studies over an extended period of time (Horsten, Victor & Hamman, 1979; Archer, 1980; Archer 1981a and 1981b; Retief, Hamman & Affleck-Graves, 1984; Retief, Affleck-Graves & Hamman, 1984; Retief, Affleck-Graves, Archer & Hamman, 1985; Du Plessis, Archer & Affleck-Graves, 1986a and 1986b; Gevers & Hamman, 1988a and 1988b; Gevers, 1988). Gross inaccuracies in the balance sheet are normally captured by the fact that the balance sheet should balance, but income statement data cannot be checked that easily. A number of researchers have, however, used the database recently and in the process performed systematic checks on the data. All errors that were found were validated and corrected. In addition, the author also extracted from the database various accounting numbers of interest and performed systematic checks for missing values and unexpected changes. It can thus be stated with a high degree of confidence that the USB accounting database is accurate.

3.3.3 The models investigated

3.3.3.1 *Introduction*

In evaluating the effects of inflation on the financial results of a company, some form of measurement of inflation has to be used. Ideally one should calculate adjustments based on company specific inflation rates. These rates were, however, not publicly available. It was thus not possible to do better than use a general index like the Consumer Price Index (CPI) as published monthly by the Central Statistical Services. Although the price indices for specific items could differ substantially from the CPI, one would expect that the average price index for companies with fairly diversified asset structures would not differ too much from the CPI. It was also found that there existed a fairly high degree of collinearity between various specific price indices published in South Africa. Thus the use of the Consumer Price Index for the calculation of the inflation adjustments was probably warranted. In their empirical work based on estimated inflation adjustments, Du Plessis, ***et al.*** (1986a; 1986b), Matolcsy (1984; 1986) and Gevers and Hamman (1988a; 1988b) also used the CPI as a basis to determine the inflation adjustments.

The first type of inflation accounting model that will be investigated is based on AC201. Although AC201 is specific on what constitutes an adjustment for inflation, it is not that specific on how it is to be determined. Two models which differ with respect to the classification of items on the balance sheet result in fairly divergent inflation-adjusted results. The classifications and calculations required are discussed in more detail in Section 3.3.3.2.

The second type of model is based on a suggestion by Hamman (1986) in which certain balance sheet items were considered neutral and thus requiring no adjustment for the effect of inflation. These models are discussed in Section 3.3.3.3.

The third type of model tries to circumvent lengthy calculations for inflation adjustments and could be considered to be a one-line adjustment model. Two of these crude models are discussed in more detail in Section 3.3.3.4.

The specific treatment of accounting data for the different models is detailed in the sections that follow. Some of the accounting data are treated the same, irrespective of the model used. The treatment of these data is mentioned below.

* If a company discloses an asset named "Goodwill, trademarks and licenses", it is not treated as an asset, but is subtracted from equity. This is in line with the practice of most companies (Steele, Farber & Dickinson, 1988: 141).

* Fixed assets are always determined as the sum of the book value of land and buildings, and other fixed assets.

* Total assets are defined as the sum of all fixed assets, investments, loan levies and total current assets.

* Net asset value is defined as total assets minus all current liabilities, all long term loans, deferred taxation, all preference share capital, minority interest, as well as the non-distributable reserve resulting from the revaluation of fixed assets. With this definition it is attempted to construct a historic cost book value of equity. It is acknowledged that the non-distributable reserve that is subtracted is not necessarily equal to the revaluation of fixed assets, but it is the best, and often only, proxy for the revaluation of fixed assets.

* Non-monetary assets always include all fixed assets and inventories. Investments and loan levies are treated differently, depending on the model used.

* Net monetary liabilities always include all non-convertible long term loans plus all

current liabilities, minus all current assets, excluding inventories. Investments, preference share capital and loan levies are treated differently, depending on the model used.

* Historic cost income is defined as income after taxation, plus earnings from associated companies, minus minority interest in income, minus preference dividends.

Typical computer printouts for the various models used are provided in Appendix A. They give sufficient detail to disclose the logic used in calculating the different adjustments.

3.3.3.2 *AC201 models*

Since AC201 is not that specific on the classification of assets and liabilities as either monetary and non-monetary, which has an effect on how the inflation adjustments could be calculated, it has lead to the development of a computer model which can be applied to the standardised accounting database and is driven by various parameters. Depending on the values of the parameters, different results are generated. These inflation-adjusted results may vary considerably. Two alternative models based on AC201 are developed and investigated. The one seems to be pessimistic as regards the impact on income, while the other is probably more realistic.

AC201 requires the following adjustments:

(a) additional depreciation on fixed assets;
(b) a cost of sales adjustment; and
(c) a gearing adjustment, which is replaced by a net monetary assets adjustment if the company's monetary assets exceed its monetary liabilities.

(a) *Additional depreciation*

In order to determine the additional depreciation on fixed assets, it was necessary to estimate the age of the fixed assets. The average age of fixed assets is determined by the ratio:

$$\text{Average age} = \frac{\text{Accumulated depreciation}}{\text{Depreciation for the year in the income statement}} \qquad \ldots(3.1)$$

This average age method has been used widely (Ketz, 1978; Short, 1985). It could, however, lead to incorrect estimates of the average age of fixed assets. If the annual acquisition of fixed assets by a company fluctuates considerably, Equation 3.1 will not yield the correct estimate of the age of the fixed asset. An additional problem occurs if a company has revalued its fixed assets. If the book value of the fixed assets has been adjusted, it implies that both the cost price and the accumulated depreciation have been adjusted using the same percentage, leading to fewer problems in the estimation of the age of the fixed assets. If only the cost price or the accumulated depreciation of the fixed assets has been adjusted, or if they have been adjusted using different percentages, Equation 3.1 can yield fixed asset ages which differ considerably from the actual average age.

The average age calculated has been arbitrarily cut off at a maximum of five years. This assumption was used merely to ensure that the average age of assets did not exceed 50 percent of the normal 10 year life of equipment. In terms of inflation adjustments, this assumption is conservative, since the real adjustments for additional depreciation could in fact be larger.

In calculating the age of assets, fixed assets were considered to be the sum of land and buildings and other fixed assets. Land and buildings have seldom been depreciated, and if they had been depreciated, they were depreciated over a period longer than 10 years. This could have biased the age determination slightly upwards. The cut-off average age of 5 years should, however, have limited the possible impact of this potential bias.

The additional depreciation adjustment is calculated as follows:

$$\text{Additional depreciation} = \begin{array}{l}\text{Historic cost}\\ \text{depreciation } \boldsymbol{ex}\\ \text{income statement}\end{array} \times \left(\frac{\text{CPI on balance sheet date}}{\text{CPI on purchase date}} - 1 \right) \quad \text{...(3.2)}$$

where the purchase date = balance sheet date − average age of assets.

If a company has made provision for additional depreciation in its income statement, the larger of the calculated value and that provided by the company is used. The rationale for this treatment of the additional depreciation is as follows. If the additional depreciation disclosed by the company is more than that calculated by the model, the company specific inflation rate was probably more than the annual change in the CPI, and hence the disclosed value is the better one to use. If the additional depreciation disclosed by a company is less than that calculated by the model, it could mean that the company only revalued certain assets and determined its additional depreciation only on those assets that were revalued. It could also mean that the company had revalued all of its assets, but that the company specific inflation rate was less than the annual change in the CPI. Some of the annual statements of companies that disclosed additional depreciation were perused and it was found that they did not revalue all their assets. Hence it was assumed that the additional depreciation calculated by the model was the better value to use.

If additional depreciation had been charged to the income statement without a note which clearly identified the ordinary depreciation based on historic cost and the additional depreciation, an incorrect asset age estimate could be made (the age estimated is too small). Since the company had already written off additional depreciation, charging it with an additional amount would be erroneous. It was hoped that in these cases, which were impossible to identify, the possible shorter asset age estimates would limit the size of the error.

(b) *Cost of sales adjustment*

In determining the cost of sales adjustment, the method of averages is used. This method is best illustrated using an example. If the opening inventory value is R450 and the closing inventory value is R500, and the price indices are 120, 130 and 142 at the beginning, middle and end of the financial year respectively, the cost of sales adjustment is:

$$450 \times \left[\left(\frac{130}{120}\right) - 1\right] + 500 \times \left[1 - \left(\frac{130}{142}\right)\right]$$

$$= \quad R37{,}50 + R42{,}25 = R79{,}75$$

If a company had used the last-in-first-out (LIFO) method of inventory valuation, a different procedure was followed. Firstly the first-in-first-out (FIFO) inventory value was reconstructed using the reported LIFO-reserves. A cost of sales adjustment was then calculated based on the reconstructed FIFO inventory values, using the method of averages. The net cost of sales adjustment was then presumed to be the difference between calculated value (based on reconstructed FIFO inventory values) and the reported LIFO adjustment, or the LIFO adjustment, whichever was the larger. This procedure was necessary since only a few companies that used the LIFO method of inventory valuation actually valued *all* their inventory on a LIFO basis. The method used would then account for those inventories that were reported on a FIFO basis.

This calculation also contains a possible bias. If a company used the LIFO method of inventory valuation for all its inventories, the reported LIFO adjustment could be identical to the cost of sales adjustment. If the company specific inflation rate was, however, less than the annual change in the CPI, the model would incorrectly calculate a larger adjustment. Since it was impossible to determine what proportion of a company's inventories were valued according to the LIFO principle, it was impossible to determine the correct adjustment. The procedure followed at least had the advantage that all companies were treated identically. In addition the number of companies that used the LIFO method of inventory valuation was limited to approximately a third of all industrial companies (Firer & Mowszowski, 1984) and most reverted back to FIFO valuation after the tax benefits of the LIFO inventory valuation was abolished in March 1984 (Van

Blerck, 1984). The effect of a slight incorrect treatment for some of the companies should thus be limited.

(c) *Gearing adjustment*

The gearing adjustment of AC201 tries to provide for the method of financing the business. The gearing adjustment, which is used to reduce the total adjustment, is calculated as follows:

$$\text{Gearing adjustment} = \text{Current cost adjustments} \times \frac{\text{NML}}{\text{NML} + \text{other credits}} \qquad \ldots(3.3)$$

where

Current cost adjustments	=	additional depreciation + cost of sales adjustment;
NML	=	net monetary liabilities; and
other credits	=	the sum of shareholders' equity, plus convertible debentures, plus minority interest, plus deferred taxation, plus preference share capital (depending on classification).

For companies that reported inventories based on a LIFO valuation, the gearing adjustment is calculated using the full cost of sales adjustment (based on reconstructed FIFO valuations) as part of the current cost adjustment.

In determining the net monetary liabilities one must classify assets and liabilities as either monetary or non-monetary. Depending on the classification used, different adjustments are generated. Two different classifications were used, leading to the two models which are expanded on below.

AC201 requires that a company which holds net monetary assets, that is, its monetary assets exceed its monetary liabilities, makes no gearing adjustment. A monetary asset adjustment, which is added to the current cost adjustments, must then be made. The net monetary asset adjustment is based on the opening and closing monetary asset positions and calculated using the method of averages, as was used for the cost of sales adjustment.

For the first model based on AC201, which will henceforth be known as Model AC201/1, all investments, loan levies and loans (assets) were classified as monetary assets together with the current assets. All preference shares, minority interest, convertible debentures and deferred taxation were considered to be non-monetary liabilities (other credits), which leaves long term loans and current liabilities as the monetary liabilities. These classifications lead to a more frequent occurrence of net monetary asset situations which incur the highest total inflation adjustment.

Ideally one should have subdivided the investments held by the company into two classes, namely investments for which the market value was larger than the book value, and investments for which the market value was less than or equal to the book value. Investments of which the market value was more than the book value should then be considered as non-monetary. The remaining investments could then be optionally classified as either monetary or non-monetary. The standardised accounting database, however, does not provide for this option. The result was that this model, AC201/1, will tend to give a pessimistic picture of how a company's financial results are affected by inflation.

The second model based on AC201 is known as Model AC201/2. In this model all investments, loan levies and loans (assets) were classified as non-monetary assets, leaving only current assets as monetary assets. The classification of the liabilities as monetary and non-monetary items was similar to that used in Model AC201/1, except for preference shares, where only *convertible* preference shares were considered to be non-monetary liabilities. This classification is probably the most realistic classification in terms of monetary and non-monetary items.

3.3.3.3 *Models with neutral items*

The gearing adjustment which is used in AC201 and SSAP No. 16 (1980) has been debated extensively in the past (De Jong, 1984; Pendrill, 1982; Scapens, 1983). In line with Pendrill's (1982) arguments for a symmetric treatment of monetary assets and monetary liabilities, Hamman (1986) suggested the use of separate adjustments for both monetary liabilities and monetary assets. Hamman (1986), however, argued that certain assets and liabilities were not influenced by inflation and as such should be considered neutral, requiring no adjustment.

Two models were developed on the principles set out by Hamman (1986). These models only differ in terms of the items which were considered to be neutral. Both these models use a cost of sales adjustment and an additional depreciation adjustment as was determined for the AC201 models. The gearing adjustment of AC201 was, however, replaced by two further adjustments.

A monetary assets adjustment is calculated using the method of averages and the opening and closing monetary assets for a particular year. This adjustment constitutes the additional funds that are required to keep the company's monetary assets at the same operating level as in the past and is added to the cost of sales and additional depreciation adjustments.

A monetary liability adjustment is also determined in the same way as the monetary asset adjustment. This adjustment, however, constitutes the reduction of the additional funds required by the company due to holding non-shareholders' funds. This adjustment is used to reduce the sum of the other three adjustments. When the total net adjustment is subtracted from the historic cost income, the result is the income attributable to ordinary shareholders. These two adjustments are both based on a general index such as the CPI, which was used in this research.

On analysing Hamman's (1986) suggestion, one could split the monetary assets and liabilities differently, namely into net monetary working capital, and a long term monetary position. By applying the CPI to these data, one ends with a net monetary working capital adjustment similar to the adjustment required in the UK under SSAP No. 16, and a purchasing power gain on long term non-shareholders' funds. Alternatively, the net effect of Hamman's two adjustments is similar to the requirement under FSAB Statement No. 33 for the disclosure of purchasing power gain or loss on net monetary items. In the USA this value was, however, only disclosed, and not used in calculating an adjusted income.

In the first of these two models, named NEUTRL/1 hereafter, all investments, cash and bank overdraft were considered to be neutral items. They were thus neither non-monetary nor monetary items. In addition all non-convertible preference shares were considered to be monetary liabilities. Convertible preference shares, minority interest, convertible debentures and deferred taxation were considered to be non-monetary liabilities, while loan levies and loans (assets) were taken as non-monetary assets. If the classification of assets and liabilities as monetary and non-monetary items for this model are compared with the AC201 models, it is clear that apart from the neutral items, Model NEUTRL/1 uses the same classification as Model AC201/2.

The second of the models using neutral items is known as NEUTRL/2. It only differs from Model NEUTRL/1 in that cash and overdraft are considered to be monetary items. Thus only investments remain as neutral items. Since in Model AC201/2 investments are considered to be non-monetary, and thus requiring no adjustment, the difference between Model AC201/2 and Model NEUTRL/2 thus lies solely in the replacement of the gearing adjustment of AC201 with the monetary asset and liability adjustments as suggested by Hamman (1986).

3.3.3.4 *One-line or crude models*

As a result of the intricacies of many of the proposed models for inflation accounting world wide, there has been a demand for a model that would be easy to apply. Steele (1985b) puts forward a well argued case for a simplified adjustment. To quote him: "It is this fundamental arbitrariness at the core of adjusting income for the effects of inflation, which suggests that for consistency (and sanity) a broad-brush approach is appropriate." (Steele, 1985b: 147)

The crudest of these adjustments is a simplified constant purchase price adjustment which requires only the maintenance of shareholders' funds (Knights, 1986: 143). This single adjustment to income based on historic costs, is calculated by multiplying opening shareholders' funds by the change in the CPI over the reporting period. Although this adjustment is crude, and does not take into account the holding gains on fixed assets nor the realised holding gains included in the historic cost income, Gevers (1988: 344) found that he could estimate AC201 adjusted income using as an adjustment shareholders' funds multiplied by a percentage that did not differ much from the annual change in the CPI. As such it warrants further investigation.

The first one-line adjustment model, which is called CRUDE/1 hereafter, is based on the maintenance of shareholders' funds. Shareholders' funds were considered to be equal to ordinary share capital, all distributable and non-distributable reserves, minority interest and convertible preference share capital. Deferred taxation, non-convertible preference share capital and convertible debentures were excluded from shareholders' funds. (This is different to the AC201 models, since AC201 specifies that deferred taxation is to be considered as equity.) The reason for this classification is as follows. Deferred taxation can be seen as an interest free, indefinite term loan from the state to the company. If the deferred taxation should become payable (which is usually unlikely) it will be repaid in monetary terms. There is thus no need to maintain the purchasing power of these funds. Similarly, convertible debenture holders get preferential treatment over ordinary shareholders through the interest payments and could thus be treated as debt. This limited definition of equity leads to a smaller inflation adjustment.

In suggesting a one-line inflation adjustment Archer and Steele (1984: 484) proposed the use of the opening shareholders' funds adjusted for changes during the financial year. Thus the average of the opening and closing values of shareholders' funds is used for this model. The average shareholders' funds is multiplied by the annual increase in the CPI to yield the adjustment to income.

A second model, which closely resembled Archer and Steele's (1984: 484) proposal, was also investigated and named CRUDE/2. They proposed an adjustment which consisted of two parts. The first part is an adjustment to keep shareholders' equity intact in terms of an index. This part will cause a reduction in the stated income. The second part is an adjustment in the opposite direction indicating the increase in nominal value of the non-monetary assets using the same index as in the first part. They (Archer & Steele, 1984) also proposed that the beginning of the year amounts of non-monetary assets should be restated at their historic cost adjusted for changes in a general index, or at the current cost if the current cost is less. Shareholders' equity would be the restated amount for the assets minus the liabilities. An example of the calculations for the two CRUDE models is given in Table 3.1.

In Model CRUDE/2 only the fixed assets were included, since it is possible to age them approximately using the same method as was employed in the calculation of the additional depreciation for the AC201 models. Inventories were not included as part of the assets that were adjusted, since it was felt that unless inventory turnover was very slow, inventories were reported at values close to market value. Investments were also excluded from the adjustment. In order to determine the restated value of equity, the liabilities were subtracted from the restated value of the assets (revalued fixed assets plus all other assets). The following items were considered to be liabilities: all long term loans (including convertible debentures), non-convertible preference share capital, deferred taxation and total current liabilities.

A close study of ED77 (SAICA, 1989) and a further exposition by Stainbank (1990: 84-86) showed that the CRUDE/2 model was also a crude model of ED77. ED77 required that historic cost income be reduced by the current cost adjustments (cost of goods sold and additional depreciation adjustments, which are just realised holding gains). It then required that total value changes be added to yield the comprehensive income. The total value changes consisted of the realised and unrealised holding gains. The final adjustment according to ED77 was the transfer to the capital maintenance reserve. The

Table 3.1: Example of the two CRUDE inflation adjustments

	Balance sheet date	89/06	88/06
1	Fixed assets (HC)	1500	1270
2	Other assets (HC)	2440	1840
3	**Total assets (HC)**	**3940**	**3110**
4	Equity (HC)	1660	1500
5	All other liabilities (HC)	2280	1610
6	**Total liabilities (HC)**	**3940**	**3110**
7	Accumulated depreciation	750	660
8	Current depreciation	150	130
9	Average age of assets (years)	5,0	5,0
10	Purchase date of assets	84/06	83/06
11	CPI on balance sheet date	177,7	153,6
12	CPI on purchase date	85,6	76,6
13	Factor (11 ÷ 12)	2,076	2,005
14	**Revalued fixed assets (1 × 13)**	**3114**	**2546**
15	Other assets (2)	2440	1840
16	Revalued total assets (14 + 15)	5554	4386
17	**Revalued equity (16 − 5)**	**3274**	**2776**
18	**Change in CPI**	$\left(\frac{177{,}7 - 153{,}6}{153{,}6} \times 100\right) = 15{,}7\%$	
19	**CRUDE/1 adjustment**	$\left(\frac{1660 + 1500}{2} \times 0{,}157\right) = 248$	
20	**CRUDE/2 adjustment**	$+\left(\frac{3274 + 2776}{2}\right) \times 0{,}157 = +475$ $-\left(\frac{3114 + 2546}{2}\right) \times 0{,}157 = -444$ $= 31$	

net effect of subtracting current cost adjustments and adding value changes was to simply add unrealised holding gains. In the CRUDE/2 model the unrealised holding gains were approximated by the fixed asset adjustment, while the transfer to the capital maintenance reserve based on financial capital maintenance was equity multiplied by the annual change in the CPI.

To determine the adjustment, the average of the opening and closing amounts of the revalued fixed assets and revalued equity are multiplied by the annual change in the CPI to determine the two parts of this adjustment. The difference of the two parts constitutes the final adjustment. If the increase in the value of assets, however, exceeds the amount required to maintain shareholders' equity, the net adjustment is made equal to nought. This follows the recommendation of Archer and Steele (1984: 484).

The CRUDE/2 model is probably the most optimistic of the models evaluated. It does not include a cost of sales adjustment, nor an additional depreciation adjustment. On the other hand the overall income is increased by the unrealised holding gains on fixed assets.

3.3.4 Real dividend cover

In order to determine the adjusted or real dividend cover, the adjustment to income due to inflation was subtracted from the income after taxation. If the financial statements, however, reflected a consolidation of minority interest, the inflation adjustment should be appropriated to the ordinary shareholders and the minority interests, indicating that not all of the adjustment was due to the ordinary shareholders, leading to a more favourable adjusted dividend cover.

The appropriation of the inflation adjustment was determined as follows. The total inflation adjustment was expressed as a percentage of income after taxation. The minority interest in the income was then multiplied by this percentage, and the result was subtracted from the total inflation adjustment (indicating that this proportion of the total adjustment was due to the minority interest), leaving a reduced adjustment. The reduced adjustment was then subtracted from the income after taxation to yield an adjusted income. Retained earnings from associated companies were then added and the minority interest in the income as well as the preferred dividends were subtracted to yield the income attributable to ordinary shareholders. This amount was divided by the amount paid in ordinary dividends to yield the adjusted dividend cover. The proportion of the inflation adjustment which was attributed to the minority interests was limited to the minorities' contribution to the total income. Thus, if the inflation adjustment was larger than the historic income, the inflation adjustment which was attributed to the minorities was set equal to their contribution to income.

A better way of proportioning the inflation adjustment between the minorities and the ordinary shareholders, would be to use the relative weight of the shareholders' equity and the minorities' interest in financing the consolidated assets in the balance sheet. The minorities' interest shown in the balance sheet can, however, not be used to determine the proportion of the minorities' interest in the income statement. This could thus lead to an incorrect appropriation of the inflation adjustment. For this reason the appropriation based on the contributions to the total income was used.

The appropriation of the inflation adjustment based on the contributions to the total income worked well provided that both the holding company and the subsidiaries showed a positive income. As soon as either the holding company or the subsidiaries reported a negative income (i.e. a net loss), an alternative method of allocating the inflation adjustment was required. Since the sign of the income was changed, the inflation adjustment as a percentage of income becomes negative, yielding a negative appropriation of the inflation adjustment, which meant that more than 100 percent of the actual adjustment was being allocated! This was clearly incorrect.

If a subsidiary company reported a net loss, the consolidated income of the holding company was reduced by this loss. If the principle that was used in the original model, namely that the minorities should not be allocated a proportion of the inflation adjustment that exceeded their contribution to income, the solution to this problem became simple. Since the minorities did not contribute to the (positive) income, the total inflation adjustment should be attributed to the ordinary shareholders, and nothing should be attributed to the minorities. Although easy to apply, this method of appropriation seemed to be too simplistic. The total inflation adjustment of which a portion is due to the minorities, is attributed to the ordinary shareholders, yielding an adjusted dividend cover which is less than the 'true' adjusted dividend cover. It would seem as if an appropriation of the inflation adjustment based on the shareholders' equity and minority interest as reported in the balance sheet would yield a better (although not always correct) adjusted dividend cover.

If the reported consolidated income after taxation of the holding company was negative (i.e. a net loss), a similar situation to the one above arose, whether the subsidiary companies report a net loss or not. An appropriation of the inflation adjustment based on the income could yield a negative percentage leading to an appropriation of more that 100 percent of the actual inflation adjustment, and this was clearly incorrect. If the subsidiary companies reported a positive income, it was only fair to attribute a portion of the inflation adjustment to the subsidiaries. The problem was, however, to determine which proportion. It was clearly incorrect to allocate all of the inflation adjustment to the ordinary shareholders only. Thus it seemed as if the best solution was again to use balance sheet data to determine the appropriation. Although this method of appropriation was not entirely correct, it was better than that obtained by any other method.

3.3.5 Statistical analysis

The adjustments to income resulting from the various models were difficult to compare due to the difference in the size of the accounting data reported by the companies. It was therefore necessary to standardise the values. Although dividing the adjustments by the reported historic income would yield a value indicating the size of the income adjustment relative to the reported income, this value was likely to be fairly volatile due to the variations in the reported income. This problem would be aggravated if a company were to report a net loss, yielding negative adjustment percentages. To avoid this volatility and to have a stable base that would not change in sign, it was decided to standardise the adjustments by dividing them by the total assets of each company.

The standardised adjustments will be analysed statistically using analysis of variance (ANOVA) to determine whether the mean adjustments of each model differed significantly from the mean adjustments of the other models. In performing the analysis of variance, it is necessary to evaluate the underlying assumptions in the use of this procedure. The data will be checked for equality of variance and normality of the raw data. If these assumptions are violated, the Kruskal-Wallis nonparametric analysis of variance will be performed.

One of the assumptions of both the parametric and nonparametric analysis of variance is that the values should be independent of another. This requirement could possibly be violated, since the same underlying income statement and balance sheet data are used to generate the adjustments. It is nonetheless felt that the models differed sufficiently (except perhaps for models NEUTRL/1 and NEUTRL/2) to perform the said test.

The calculated real dividend covers are only meaningful for the particular companies themselves. Rather than reporting the calculated values, or a sector average (which could be very misleading), the number of companies that display real dividend covers less than one and greater than one for each of the models will be reported.

3.4 RESULTS

3.4.1 Inflation adjustments to income

The average inflation adjustment to income expressed as a percentage of total assets is given in Appendix B on an annual basis for each of the models and each of the industrial sectors on the JSE. The overall mean inflation adjustment for all industrial companies in the sample are summarised in Table 3.2 for all six models and all eight years.

Table 3.2: Average inflation adjustment as a percentage of total assets per year

YEAR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
1982	4,84	4,04	3,62	3,44	6,45	2,77
1983	5,26	4,55	4,41	4,24	5,64	2,34
1984	5,43	4,87	4,88	4,81	5,07	1,89
1985	7,66	6,86	7,26	6,90	7,30	2,61
1986	7,73	6,84	6,82	6,41	7,93	2,73
1987	8,23	7,27	7,61	7,53	7,08	2,80
1988	8,32	7,48	8,37	8,36	5,24	2,33
1989	7,57	6,84	7,44	7,25	6,02	2,63

From the overall results it seems as if the initial description of the AC201/1 model as pessimistic and the CRUDE/2 model as optimistic is verified. The AC201/1 model has the highest adjustment percentage except in 1986 when it was eclipsed by the CRUDE/1 model. The CRUDE/2 model always displays the lowest adjustment percentage.

The AC201 and NEUTRL models also display a growth in the adjustment percentage over the years. This is possibly due to the cost of sales and/or additional depreciation adjustments. That would indicate that the monetary value of inventory has been growing faster than the total assets, which is indicative of the effects of inflation. It could also indicate an ageing fixed asset base which requires fairly large provisions for replacement (additional depreciation). If that is in fact the case, one should question the wisdom of excluding these adjustments from the CRUDE models.

Figure 3.1 shows a graphical presentation of the numbers reported in Table 3.2. Although there are differences between the results, there is a high degree of co-movement between the AC201 and NEUTRL adjustments over time. This co-movement confirms that these models are primarily driven by the cost of sales and additional depreciation adjustments, and that the gearing adjustment for the AC201 models and the monetary items adjustments for the NEUTRL models are of lesser importance.

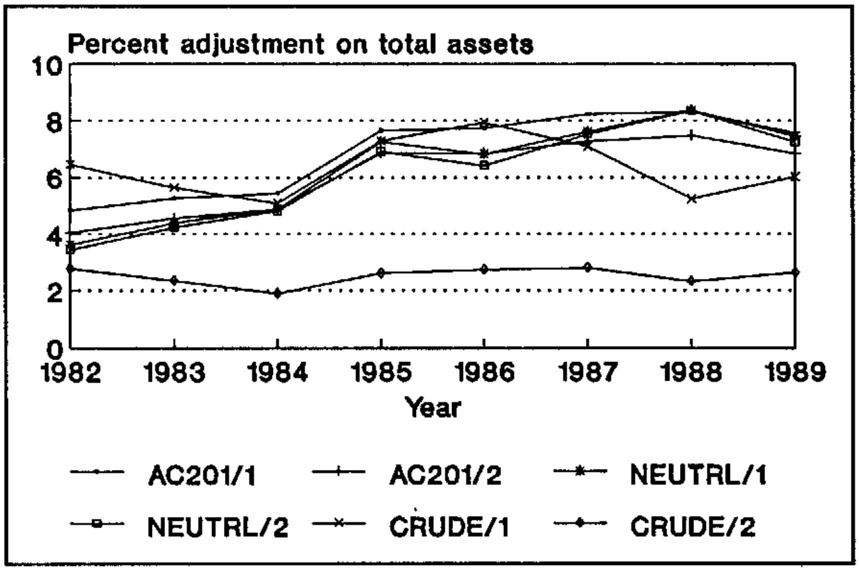

Figure 3.1: Average inflation adjustments for all industrial companies

When the values presented in the tables in Appendix B are scrutinised in more detail, it is clear that some sectors have comparatively low adjustments, while others have fairly high adjustments. As an example the adjustments of the Steel & Allied sector and the Clothing, Footwear & Textiles sector are depicted in Figures 3.2 and 3.3 respectively. The low adjustment percentages found in the Steel & Allied sector are likely to be attributable to the fact that this sector is small and was dominated (before the listing of Iscor) by Highveld Steel. It is known (De Jong, 1989: 73) that Highveld Steel does provide for the replacement of assets in its income statement, leading to lower overall adjustments. Figure 3.3 shows a completely different picture.

The Clothing, Footwear & Textiles sector is one of the larger industrial sectors on the JSE and thus the results cannot be attributed to a single company. The CRUDE models generally show considerably lower adjustments than the other models. This is indicative of high cost of sales and additional depreciation adjustments. Gevers and Hamman (1988: 18) reported similar results based on AC201 when they showed that these two adjustments for this sector were of the largest amongst the various industrial sectors.

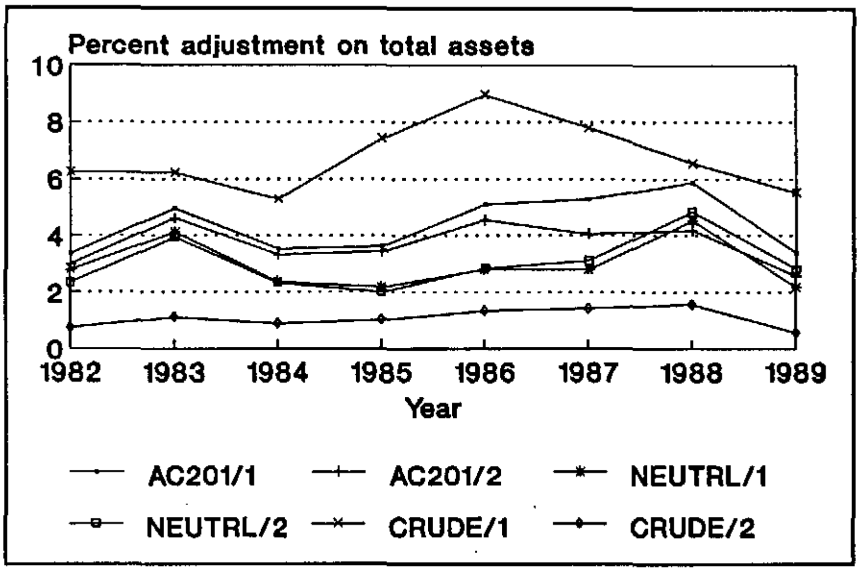

Figure 3.2: Average inflation adjustment for Steel & Allied

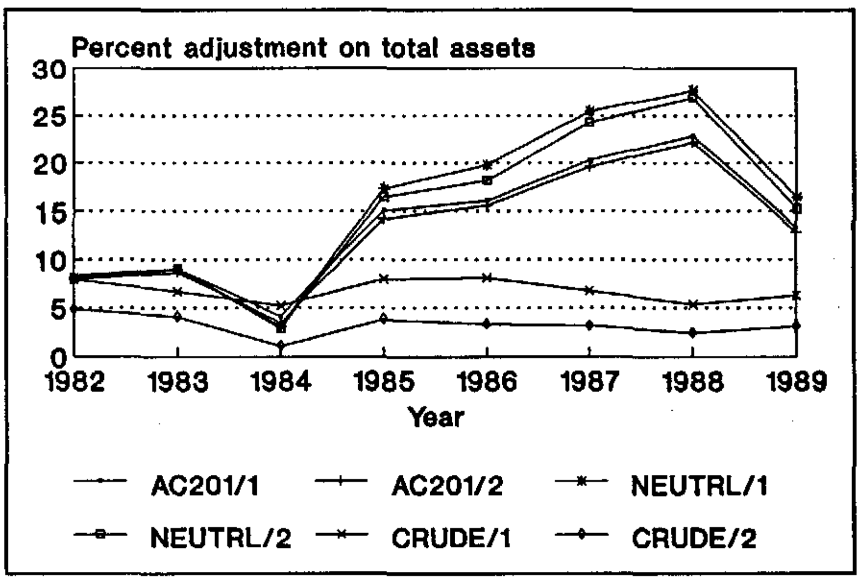

Figure 3.3: Average inflation adjustments for Clothing, Footwear & Textiles

The adjustments were subsequently subjected to statistical testing. The adjustments for each year were analysed separately with the aid of the Statgraphics software. Prior to commencing the analysis of variance, the adjustment data for 1989 was checked for normality. Summary details of the distribution and the goodness-of-fit test are given in Table 3.3.

Table 3.3 : Summary statistics for adjustment data of 1989

Sample size	1878
Average	6,291
Median	5,162
Standard deviation	6,411
Minimum	-4,623
Maximum	69,949
Skewness	4,544
Kurtosis	31,034
χ^2-square test for Normality	966,36 9 degrees of freedom p-value = 0,000

The data was skew to the right, and displayed positive kurtosis. Since the data was uni-modal and the sample was large (1878 adjustments in 1989 and a minimum of 1188 in 1986), it was thought that the deviation from normality could perhaps be tolerated if the other requirements for the analysis of variance were met.

The variances of the adjustment percentages for 1989 of each of the six models were then tested for equality. Statgraphics returned test statistics for Bartlett's and Cochran's tests indicating that the variances of the six models differed significantly ($\alpha < 0,01$). Snedecor and Cochran (1980: 253) indicated that for distributions with positive kurtosis, Levene's test is better specified than Bartlett's test. The analysis of the absolute deviations from their respective model means, as required by Levene's test, also indicated that the variances of the six models were not equal ($\alpha < 0,01$). This result made the use of a parametric ANOVA undesirable.

The only nonparametric ANOVA test available on Statgraphics that can cope with six different models and at the same time allow for the fact that the companies belong to various sectors (it was intended to use the sectors as a blocking factor), is the Friedman test. This test is, however, designed for completely randomised block designs, where for each treatment (model) and blocking factor (sector) there should be one observation. The available data, however, consists of a number of observations for each treatment/blocking factor combination. Thus the Friedman test was also ruled out. As a result the Kruskal-Wallis test, which is a nonparametric ANOVA test based on ranks, is selected to determine whether the inflation adjustments generated by the various models are in fact different. The possible differences introduced by the various sectors will thus not be evaluated. This was not considered to be too serious since the purpose of the analysis was only to identify unique models, and the availability of data would in any case not have been sufficient to control for industry effects in the research reported in Chapter Five and Six.

The results of the Kruskal-Wallis tests for the various years are presented in Table 3.4. If the Kruskal-Wallis test indicated that the treatments (models) differed significantly, one would like to know which of the models differed significantly from the others. Unfortunately Statgraphics does not provide for a test to determine these differences. Conover (1980: 231), however, described a test to determine significant differences in mean ranks. Details of the test are given in Section 4.3.4 in Chapter Four of this dissertation. These differences were calculated and the models which seemed not to differ significantly were grouped. Membership to a group of models is indicated with an * in Table 3.4. If a model is unique, the group to which it belongs will have no other members. Thus for 1989, Model CRUDE/2 is unique. Model CRUDE/1 could belong to a group containing Model AC201/1 or a group containing the NEUTRL models.

Table 3.4: Kruskal-Wallis test for difference between models

Year : 1989		**Group**		
Model	**Average rank**	**1**	**2**	**3**
AC201/1	1 131,17	*		
AC201/2	1 022,00		*	
NEUTRL/1	1 000,41		*	
NEUTRL/2	991,19		*	
CRUDE/1	1 061,78	*	*	
CRUDE/2	430,45			*

Sample size per model = 313 Test statistic = 344,88
Significant difference in ranks = 76,86 Significance level = 0,00

Year : 1988		**Group**		
Model	**Average rank**	**1**	**2**	**3**
AC201/1	912,87	*		
AC201/2	816,75		*	
NEUTRL/1	807,18		*	
NEUTRL/2	811,49		*	
CRUDE/1	785,17		*	
CRUDE/2	315,54			*

Sample size per model = 247 Test statistic = 306,94
Significant difference in ranks = 67,32 Significance level = 0,00

Table 3.4: Kruskal-Wallis test for difference between models (cont.)

Year : 1987		**Group**		
Model	**Average rank**	**1**	**2**	**3**
AC201/1	725,58	*		
AC201/2	645,00		*	
NEUTRL/1	604,83		*	
NEUTRL/2	608,52		*	
CRUDE/1	732,36	*		
CRUDE/2	286,72			*

Sample size per model = 200   Test statistic = 222,42

Significant difference in ranks = 61,43   Significance level = 0,00

Year : 1986		**Group**			
Model	**Average rank**	**1**	**2**	**3**	**4**
AC201/1	699,70	*			
AC201/2	627,63		*		
NEUTRL/1	590,61		*		
NEUTRL/2	570,52		*		
CRUDE/1	784,80			*	
CRUDE/2	293,75				*

Sample size per model = 198   Test statistic = 234,53

Significant difference in ranks = 60,67   Significance level = 0,00

Table 3.4: Kruskal-Wallis test for difference between models (cont.)

Year : 1985		**Group**			
Model	**Average rank**	**1**	**2**	**3**	**4**
AC201/1	723,83	*			
AC201/2	653,89		*		
NEUTRL/1	624,99		*		
NEUTRL/2	604,42		*		
CRUDE/1	792,95			*	
CRUDE/2	310,93				*

Sample size per model = 206 Test statistic = 222,52

Significant difference in ranks = 62,54 Significance level = 0,00

Year : 1984		**Group**		
Model	**Average rank**	**1**	**2**	**3**
AC201/1	735,82	*		
AC201/2	670,73		*	
NEUTRL/1	641,90		*	
NEUTRL/2	632,17		*	
CRUDE/1	754,49	*		
CRUDE/2				*

Sample size per model = 207 Test statistic = 226,94

Significant difference in ranks = 62,59 Significance level = 0,00

Table 3.4: Kruskal-Wallis test for difference between models (cont.)

Year : 1983		**Group**			
Model	**Average rank**	**1**	**2**	**3**	**4**
AC201/1	796,69	*			
AC201/2	709,36		*		
NEUTRL/1	681,63		*		
NEUTRL/2	657,90		*		
CRUDE/1	906,45			*	
CRUDE/2	390,97				*

Sample size per model = 230 Test statistic = 215,98
Significant difference in ranks = 67,01 Significance level = 0,00

Year : 1982		**Group**				
Model	**Average rank**	**1**	**2**	**3**	**4**	**5**
AC201/1	790,88	*				
AC201/2	686,40		*			
NEUTRL/1	631,47		*	*		
NEUTRL/2	604,36			*		
CRUDE/1	1 028,09				*	
CRUDE/2	473,81					*

Sample size per model = 234 Test statistic = 257,73
Significant difference in ranks = 66,50 Significance level = 0,00

From the results it is clear that the inflation adjustments according to the different models are not the same. When the differences in average rank between the models are scrutinised, it appears as if the Models AC201/2, NEUTRL/1 and NEUTRL/2 are not significantly different. Except for the analysis for 1982, these three models always belong to the same group. Even in 1982 Model AC201/2 and Model NEUTRL/1 seem to be in the same group, while the two NEUTRL models also do not differ significantly.

In 1989, 1987 and 1984 Models AC201/1 and CRUDE/1 appear to have measured the same inflation adjustments, but in the other years they differ significantly. It thus appears as if these models differ sufficiently that in further investigations both models should be used.

Model CRUDE/2 appears in a group of its own in each year, indicating that this model is significantly different from all other models.

Models AC201/1 and AC201/2 are in different groups in each of the 8 years analysed. This clearly indicates that these two models differ significantly. Yet they are based on the same accounting guideline. This undoubtedly shows that AC201 is open to such a broad interpretation that widely divergent inflation adjustements result. This could well be a contributing factor to the fact that few companies have in the past reported AC201-based supplementary results.

3.4.2 Real dividend cover

In Appendix C the real dividend covers of all company in each year and for each model are summarised per sector by reporting the number of companies that display a real dividend cover of greater than one and those that do not cover their dividends by inflation-adjusted income.

Whereas the inflation adjustments are merely an indication of the extent to which a company's income is affected by inflation, the real dividend cover indicates how the companies are coping with inflation. Archer (1980) has clearly indicated that the only way that companies can survive in the long run during times of inflation is by increasing profit margins or by cutting dividends to an extent that sufficient funds are retained in the businesses to ensure their continued existence. Gevers and Hamman (1988a; 1988b) and Gevers (1988) also showed that, based on AC201 adjustments, large numbers of industrial companies were apparently paying dividends out of capital. The analysis in the current research will confirm whether that situation was due to the model used to determine the inflation adjustment.

The tables in Appendix C indicate that for all models of inflation accounting, and in all the years, the proportion of companies that had dividend covers less than one is unsatisfactorily high. The CRUDE/2 model, which results in the smallest adjustments to income, also indicated the lowest number of companies that paid dividends out of capital. Even with this model the proportion of companies apparently paying dividends out of capital has been hovering around 20% except for the last two years of the analysis.

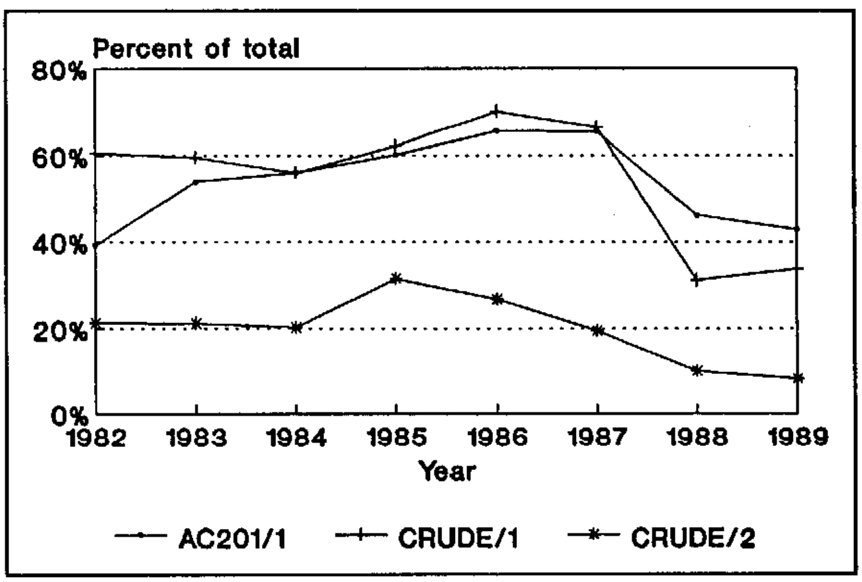

Figure 3.4: Percentage of all industrial companies with a real dividend cover < 1

The overall trend of the proportion of companies with real dividend covers less than one is shown in Figure 3.4. Only the data the AC201/1, CRUDE/1 and CRUDE/2 models are shown to avoid cluttering the graph. These three models between them encompass the best and the worst cases. From the figure it is clear that since 1985 the number of companies with real dividend covers less than one has either stabilised or actually decreased, depending on the model of inflation adjustment used. From 1986 onwards all models show a decline in the proportion of these companies. This is definitely an encouraging sign. It would appear as if industrial companies are finally coming to terms with the effects of inflation.

Gevers (1988) found that the sectors Clothing, Footwear & Textiles and Engineering displayed the highest proportion of companies with real dividend covers less than one. The proportions for these sectors are depicted over time in Figures 3.5 and 3.6 respectively. Even in these sectors it is clear that these proportions have been starting to decrease, albeit only in 1987 for the Engineering sector. One can only hope that this trend will continue in the future.

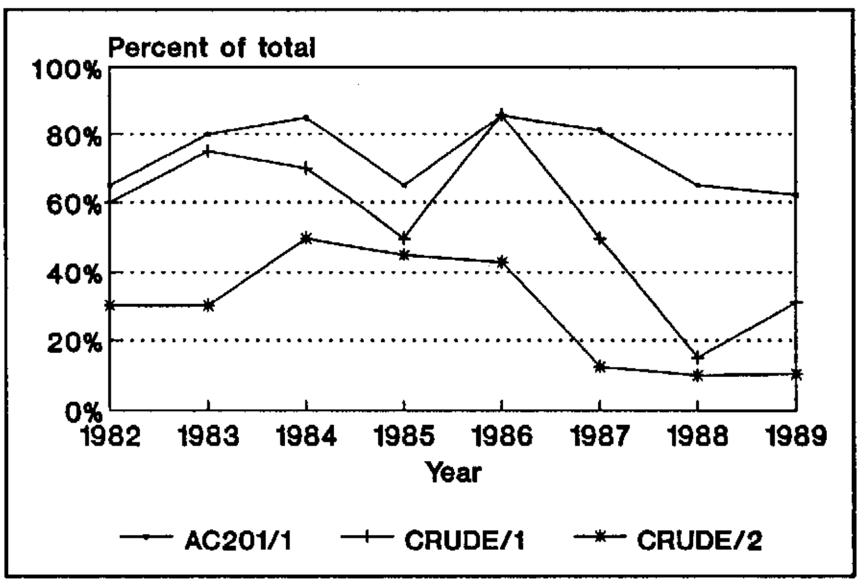

Figure 3.5: Percentage of Clothing, Footwear & Textiles companies with a real dividend cover < 1

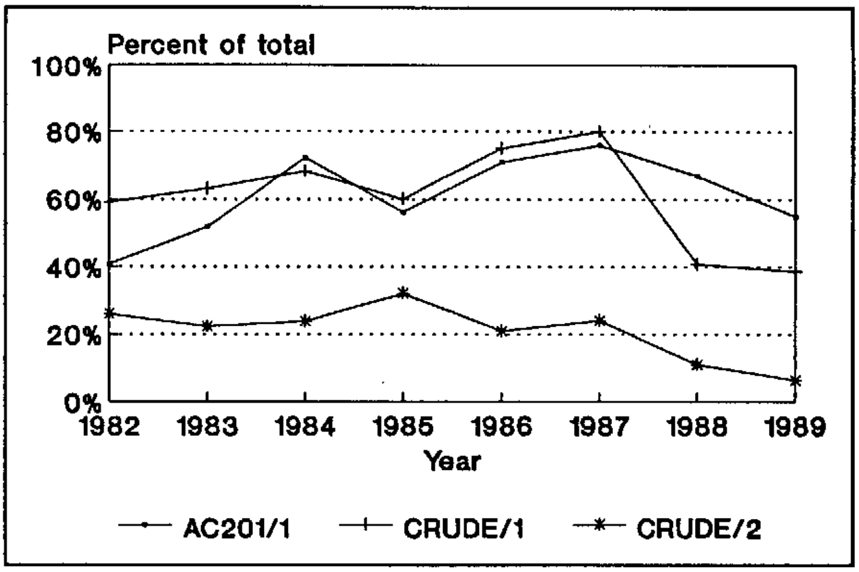

Figure 3.6: Percentage of Engineering companies with a real dividend cover < 1

3.5 SUMMARY AND CONCLUSIONS

In this chapter, six alternative models of adjusting the historic cost accounting income for the effects of inflation were developed. The models were applied to a sample of industrial companies over a period of 1982 to 1989. The total inflation adjustment of each company was expressed as a percentage of total assets and analysed to determine whether the models in fact differed in their outcomes. In addition real dividend covers were calculated to determine how the industrial companies have been coping with the effects of inflation as modelled by the different models.

As a result of the analysis it can be stated that AC201 is open to sufficiently diverse interpretations that the different classification of monetary and non-monetary items lead to significantly different inflation adjustments. The AC201/1 and AC201/2 model differed significantly in each of the eight years investigated.

The AC201/2 model did not differ significantly from the two NEUTRL models. This may well be attributed to classification of balance sheet items. The AC201/2 model considered all investments to be non-monetary, resulting in no adjustments, while in the NEUTRL models investments were considered to be a neutral item, also not leading to any adjustments. It would seem as if the NEUTRL models could be discarded in future research. It must, however, be emphasised that this interpretation is based on the results of a nonparametric test which does not display the same discriminating power as an equivalent parametric test. On the other hand the sample was large which makes this difference in discriminating power less serious. In addition the possible influence of the dependence of all the inflation accounting models on the same raw data was not taken into account.

The CRUDE/1 model, which consisted of the maintenance of equity only, using shareholders' equity multiplied by the change in the CPI, was found to be not dissimilar from the AC201/2 and NEUTRL models in three of the eight years investigated. This probably warrants its inclusion in further research.

The CRUDE/2 model, which resulted in the smallest adjustments of all the models, was found to be significantly different from all other models in all the years. The fact that the adjustments according to the CRUDE/2 model seemed to be so different from the adjustments due to the other models causes some concern regarding its appropriateness. However, since it was based on the recommendations of a comprehensive research project (Archer & Steele, 1984), and seemed like a crude ED77 adjustment, it should be included in further research.

A final comment regarding the statistical analysis for the comparison of the inflation adjustments generated by the various models must be made. In the selection criteria for the companies no specification was given for the year-end of the companies. Thus each annual sample included companies with February year-ends as well as December year-ends. Ideally one should use only companies with the same year-end in order to control for the difference in the inflation rate from the beginning of a calendar year to the end of that year. If the inflation rate is constant over an extended period, all the data over that extended period could be pooled. The inflation rate, as measured by the annual change in the CPI, was however, not constant over the period of investigation. It is hoped that the change of the inflation rate within a particular year did not seriously affect the analysis. In perusing the average inflation adjustments as given in Appendix B, it appears as if the difference in adjustment between the various industrial sectors is of more importance than the change of the inflation rate within a particular year. Unfortunately it was not possible to control for both industry and year effects in the analysis.

Having highlighted the possible shortcoming in the statistical analysis, one must also contemplate the consequences for the remainder of this study. The purpose of the statistical analysis was to determine whether the different models measure the same inflation adjustment or not. If more than one model seemed to have measured the same phenomenon, further analysis could be based on just one of the models that seemed to be the same. If it had been found that all of the models developed were similar and the subsequent research were based on just one model, the potential shortcoming could have been serious. It was, however, established that at least four of the models differed sufficiently to warrant further investigation. Although the NEUTRL models will thus not be investigated further, they may perhaps differ sufficiently from the AC201/2 model. This can only be established if these models are subjected to comparisons in which both the year-end and industry classification as well as dependence on the same raw data is controlled.

From the real dividend covers calculated, it appeared as if a large proportion of the industrial companies were still paying dividends which were not commensurate with their adjusted income, irrespective of the model used for adjusting the income. Fortunately it seemed as if 1986 was a turning point since the proportion of companies that have a real dividend cover of less than one appeared to be declining from 1986 onwards.

Having established that Models AC201/1, AC201/2, CRUDE/1 and CRUDE/2 measure different phenomena in terms of inflation adjustments, they will be subjected to market related empirical tests which are described in detail in Chapters Five and Six.

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CHAPTER FOUR

SHARE MARKET REACTION TO THE ABOLITION OF LIFO

4.1 INTRODUCTION

In Chapter Three the construction of a number of inflation accounting models was discussed. One of the adjustments required by the AC201 model was the cost of goods sold adjustment. In Section 3.3.3.2.b it was mentioned that if a company used the last-in-first-out (LIFO) method of inventory valuation for all its inventories, the LIFO adjustment would be equal to the cost of goods sold adjustment. A company that used the LIFO method of inventory valuation, valued its costs of goods sold at replacement cost. By publicly disclosing this aspect of inflation accounting, a company's income before taxation would be lower than if it reported income under the first-in-first-out (FIFO) method of inventory valuation. This would result in a lower tax burden, which in turn would improve its cash flow.

Firer and Mowszowski (1984) showed that a change to the LIFO method of inventory valuation had more implications than just the improved cash-flow. If the beneficial effects of a change to LIFO inventory valuation was taken into account, they found it surprising that by June 1983 only 31% of industrial companies listed on the Johannesburg Stock Exchange (JSE) had switched to LIFO (Firer & Mowszowski, 1984: 78).

In an efficient share market one would expect that the market would see the benefits of the improved cash flow and hence the overall financial position of companies that changed their inventory valuation from FIFO to LIFO, and hence show a positive abnormal share return on the changeover date. A negative abnormal share return on the changeover date could indicate the market's preoccupation with the reported income, implying an inefficiency. Knight, Affleck-Graves and Hamman (1985) posit that a negative share market reaction could also be due to a self-selection bias. Companies with for example working capital or liquidity problems may change to LIFO in a desperate attempt to improve their cash flow and the share market's negative reaction would be due to the underlying problems in the companies. The market could also read into the changeover to LIFO certain management expectations which could have a negative effect larger than the economic value of the improved cash flow. Arguments can thus be forwarded to substantiate both a positive or a negative share market reaction for companies that voluntarily changed their inventory valuation policy from FIFO to LIFO.

Apart from using the LIFO method of inventory valuation, some of the industrial companies listed on the JSE have also attempted to account for the affect of inflation by writing off additional depreciation and/or by disclosing supplementary current cost information according to AC201. Since the additional depreciation and supplementary disclosures do not have any economic benefit except to inform the market that management is taking the effect of inflation into account, it would be difficult to determine whether the market reacted to those disclosures, except if some form of matched pair design was used.

On 28 March 1984 the Minister of Finance announced in his Budget Speech that the tax concessions granted to companies to value their inventories on a LIFO basis, would be withdrawn with effect from the years of assessment ending on or after 1 April 1984 (Van Blerck, 1984: 468).

By using the LIFO inventory valuation method companies obtained a measurable economic benefit, which was lost with the abolition of the tax concessions. This makes the abolition of the LIFO tax benefits an ideal event to investigate how the market had valued this inflation accounting component. Since this event is not a voluntary change, the self-selection bias and other management motives should not play a role, and hence the market's reaction should be due to the effects of the loss of the LIFO tax benefits only. As such it will expand the body of knowledge regarding the reaction of the share market to public announcements that should affect companies differently. In addition information may be gleaned regarding the speed with which the information is impounded in the share price. This could then be used to evaluate the share market's efficiency.

In the next section earlier results relating to the adoption of LIFO will be reviewed in order to evaluate what the market's reaction to the abolition of LIFO tax concessions could be. In Section 4.3 the research methodology used is described in detail, while the results are reported and discussed in Section 4.4. The chapter is concluded with a summary.

4.2 REVIEW OF RELATED LITERATURE

In one of the first studies investigating the adoption of a LIFO inventory valuation policy by companies listed on the New York and American stock exchanges, Sunder (1973) reported that adopters between 1946 and 1966 displayed positive residual returns for each of the 12 months preceding the announcement date. Sunder's results were not tested for statistical significance. Biddle and Lindahl (1982) also reported a positive reaction by the share market since they found a significant association between residual returns (dependent variable) and the actual LIFO tax savings. In their model Biddle and Lindahl (1982: 563) controlled for the unexpected earnings effect by introducing two alternative additional independent variables in the regression equation. Murray (1983) compared the residual returns of a sample of LIFO adoption companies with the residual returns of various control groups. Nonparametric tests were used to establish that the LIFO adoption sample outperformed a randomly selected control group. No difference in performance was, however, found between the LIFO sample and all other control groups such as those designed to match the LIFO adoption sample. Stevenson (1987) refined Biddle and Lindahl's (1982) research by using a more precise identification of the LIFO adoption dates and controlling for unexpected earnings, firm size and systematic risk. He continued to find a significant positive association between the residual returns and the LIFO tax saving.

The positive results obtained by Biddle and Lindahl (1982) and Stevenson (1987) are useful in understanding the behaviour of the residual returns of the LIFO adopters. They do not, however, address the question of whether the residual returns of LIFO adopters were different to the residual returns of non-adopters over the same test periods. Sunder's (1973) results were not tested for statistical significance, which leaves only Murray's

(1983) positive results. These were also marginal, since only the random control group performed inferior to the LIFO change group. All other control groups, which were formed in attempts to find matching samples, were not outperformed by the LIFO change group. The documented positive share market reaction to a change to the LIFO method of inventory valuation is thus at most very limited.

Negative reaction has also been forthcoming. Brown (1980) found positive residual returns for his random control group and a negative correlation (albeit not significant) between the residual return and effects of the LIFO adoption for his LIFO change group. Ricks (1982) used a matched pair control group and found that the change sample displayed significantly lower security returns than the control group. More recently Biddle and Ricks (1988) found that the results of Ricks (1982) were limited to firms that changed to LIFO in 1974 only (the year in which the bulk of American firms that changed their inventory policy from FIFO to LIFO announced this fact). By taking into account analysts' earnings forecasts, they found a positive correlation between the residual returns and the analysts' earnings forecasts. This seemed to indicate that the negative reaction that Ricks (1982) found was unlikely to be due to investors reactions to the adoption of LIFO, but rather due to incorrect earnings forecasts.

A more recent study (Johnson & Dhaliwal, 1988) investigated the voluntary abandonment of LIFO. Although the firms abandoning LIFO experienced significant negative residual returns at announcement, a control group of non-abandonment firms also experienced negative residual returns, although smaller than those for the abandonment sample. They found little evidence of a relationship between the residual return of the LIFO abandonment sample and the acquired tax burden due to the abandonment.

Although both positive and negative reaction to the adoption of LIFO have been documented on the New York and American Stock Exchanges, the evidence seems to be far from clear-cut. Little can be deduced from the single LIFO abandonment study, since the firms have done so voluntarily. The voluntary abandonment could be interpreted as a signal of distress, and any promulgation like the abolition of the LIFO tax concessions in South Africa, cannot be compared with such a situation.

In their study of LIFO adopters on the JSE, Knight and Affleck-Graves (1983) compared the residual returns of a sample of 21 LIFO adopters with a sample of 21 non-adopters matched on industry and inventory valuation prior to the change to LIFO. No attempt was made to control for the unexpected earnings. In their results they compared the graphs of cumulative average residuals over time of the two samples and found a substantial negative impact on share returns for LIFO adopters. By partitioning their samples they further established that the negative reaction was neither influenced by the level of systematic risk nor by the potential non-stationarity of beta. The negative impact did, however, seem to be related to the impact on earnings. Furthermore they stated that it seemed as if the market was learning how to interpret a change to LIFO since the more recent adopters displayed a less drastic impact on their share prices and that the impact was imparted more rapidly. In their later paper, Knight, *et al.* (1985) compared the cumulative average residuals of Knight and Affleck-Graves's (1983) original two samples with the cumulative average residuals of a sample of 19 flip-flop companies. They noted that these companies displayed very little reaction to the announced change in inventory valuation. They did however warn that self-selection bias and the additional new information provided by the LIFO adopters could have caused the negative reaction, rather than the announcement of a change to LIFO itself.

In evaluating the research of Knight and Affleck-Graves (1983) and Knight, *et al.* (1985) it must be emphasised that their conclusions were not substantiated by any statistical testing. In this context the following comment by Brown and Warner (1980: 229) is pertinent: "The pattern of CAR fractiles on fig 1 serves to underscore the necessity for statistical test on the performance measures, since merely looking at a picture of CAR can easily result in Type I errors." Thus their conclusion that the efficient market hypothesis was not valid for the JSE (Knight & Affleck-Graves, 1983: 31) cannot be accepted on the evidence provided. The apparent preoccupation of investors with the accounting data that Knight and Affleck-Graves (1983) found may be useful in determining an expected behaviour of investors to the abolition of the LIFO tax concessions.

From the literature reviewed, it can be seen that the adoption of LIFO as inventory policy has not lead to a clear reaction by the share markets. The negative impacts found seem to indicate that investors are primarily driven by the reported income, while positive impacts seem to show that the markets realise what the benefits of LIFO are. How would one expect the market to react to the abolition of the LIFO tax concessions? The tax concessions granted in the past would be converted to a LIFO reserve and would under normal circumstances not become taxable. (This situation was changed in the annual budget of 1991.) However, all LIFO and flip-flop firms would in the future incur higher taxes and as a result have a reduced cash-flow. This should lead to a negative reaction on share prices at the time of the announcement. If investors were more sensitive to reported income, one would still expect a negative reaction for the flip-flop companies since earnings would be reduced due to the higher taxation of the subsidiary companies. For LIFO companies the reported income would depend on the accounting policy that the company adopted subsequent to the announcement. Although the tax concessions of LIFO were withdrawn, the LIFO method of inventory valuation and hence income reporting, was not prohibited. Thus if these companies were to continue to use LIFO for reporting purposes, one would expect a negative earnings effect due to the increased taxation. If the LIFO companies, however, were to revert to the FIFO method for reporting purposes, the reported income would likely be higher and hence, if the market were primarily driven by the reported income, a positive reaction on share prices could be expected. De Jong (1989) found that the majority of LIFO companies reverted to the FIFO method of reporting during the fiscal year 1984-1985. It is, however, not known when these companies expressed their intention to revert to FIFO in public. Thus it is difficult to establish what the expected reaction of the share prices of LIFO companies to the announcement under investigation would be.

4.3 RESEARCH METHODOLOGY

4.3.1 Sample formation

At the time of the announcement of the abolition of the LIFO tax concessions, a large number of industrial companies listed on the JSE reported income based on LIFO. Gildenhuys (1984) listed 79 companies that reported LIFO earnings and an additional 24 companies that used the flip-flop method. De Jong (1989) did not report any additions to this list. In this study all the companies mentioned by Gildenhuys (1984) were included in a LIFO and a flip-flop sample respectively.

Although it would have been useful if one could have formed samples identical to those used by Knight and Affleck-Graves (1983), this was not possible. Of their control group, eight companies had since adopted a LIFO policy, a further two were using the flip-flop method, and one company was delisted prior to the announcement. Of their LIFO sample one company had undergone a further change to the flip-flop method, while a further company was delisted prior to the announcement. Of the original flip-flop sample (Knight, *et al.*, 1985: 47) one had been delisted prior to the announcement.

The formation of two control groups that displayed characteristics similar to the companies in the LIFO and flip-flop samples respectively would have been desirable. Due to the fact that in some sectors of the JSE almost all the firms had changed their inventory valuation policy, it was not possible to match samples, even on industry only, without reducing the sample sizes considerably. It was accordingly decided not to try and find matched control groups, but rather to consider all industrial companies that had not changed their inventory valuation policy as a control group. The only companies that were eliminated from this control group, were those that were not listed continuously for the full period under investigation.

Companies that are not registered in South Africa are not subject to the same taxation as South African companies. For that purpose all foreign companies were excluded from the investigation. The names of the companies that formed the three samples are given in Appendix D.

4.3.2 The data

The University of Stellenbosch Business School maintains a share price analysis system that contains the daily closing prices and dividend information of all industrial shares traded on the JSE. The original data and regular updates were supplied by a large insurance company. Prior to the updating of the database of the Business School, all the supplied data was checked for accuracy.

The Monday closing prices as reported weekly in the *Financial Mail* were used as a check on the share prices. A random sample of *Financial Mails* was drawn, and subsequently a random sample of companies for each selected issue of the *Financial Mail* was drawn. The share prices of the selected companies as provided by the insurance company were compared with the prices reported in the *Financial Mail*. The share price data was found to be sound.

The dividend information supplied by the insurance company contained a number of duplications and other errors. As a result each dividend's value and last day to register were checked against those values reported in the *JSE Monthly Bulletins*. Where the two sources did not agree, the *Stock Exchange Handbook* and the *FACtS Investor's Guide* were used to confirm one of the reported values and/or dates.

The JSE Actuaries Industrial Index and its associated dividend yield were extracted from the daily sales statistics published by the JSE and stored in the system. To check whether the data had been extracted correctly, a random sample of Monday dates was drawn and the index values on those days were compared with the index values reported in the *Financial Mail*. No errors were found.

Changes in the capital structure of companies were extracted from the December issues of the *JSE Monthly Bulletin*. The anticipated price reaction to the change in capital structure was calculated and compared to the actual price movements around the dates of the changes. Where the share price behaviour was not as anticipated, the *Stock Exchange Handbook* and the *FACtS Investors Guide* were used to confirm the reported change. Only capital structure changes that were accompanied by an anticipated price movement, or those that were confirmed by an alternative source, were incorporated in this study. For example, if Company A, whose shares traded at approximately 200 cents, announced a capitalisation issue of 2 shares for every 10 shares held, one would expect its share price to decline to approximately 167 cents (200 × 10 ÷ 12) after the last-day-to-register. If this price reaction was not visible from the time series of share prices, confirmation of the announcement was sought in an alternative printed source.

4.3.3 The market model

In investigating the effect of quarterly earnings announcements on the behaviour of share prices, Watts (1978) developed a methodology to determine abnormal returns without having to resort to the Capital Asset Pricing Model (CAPM). His methodology can unfortunately not be used in this study, since various announcements are required in order to estimate a standard deviation for significance testing. This study deals with a single announcement only.

Brown and Warner (1980) found little difference in discriminating power between market adjusted returns and market model adjusted returns when used for event studies. Thus market-wide effects should be taken into account, but the method used does not seem critical in discovering abnormal market performance.

Visser and Affleck-Graves (1983) established that industrial share prices on the JSE reacted to market-wide effects, while Bradfield (1989) found that the CAPM has stood up well to empirical testing on the JSE and that its validity for JSE shares cannot be disputed. Consequently the well known market model (Foster, 1986:342), represented by Equation 4.1, will be used to determine the market model adjusted returns for each security.

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad \ldots(4.1)$$

where $R_{i,t}$ = price relative return on security i in period t;

$R_{m,t}$ = return on the market in period t;

α_i and β_i = regression parameters for security i estimated using ordinary least squares;

$\varepsilon_{i,t}$ = error return on security i in period t, where

$\varepsilon_{i,t}$ are NID$(0,\sigma^2)$, i = 1 to n (normally distributed, independent error terms with a mean of zero and a constant variance, σ^2).

In using the CAPM, share returns as well as market returns must be calculated. The next subsections give more details regarding these calculations. In addition attention is given to the residuals of the market model, which will be the subject of subsequent statistical testing.

4.3.3.1 *Share returns*

Price relative returns were calculated for each company in the three samples using the following formula.

$$R_{i,t} = \frac{P_{i,t} - P_{i,t-1} + D_{i,t} + ED_{i,t}}{P_{i,t-1}} \qquad \ldots(4.2)$$

where $R_{i,t}$ = realised return on share i in period t;

$P_{i,t}$ = closing price of share i at the end of period t;

$D_{i,t}$ = all dividends on share i with the last day to register within period t; and

$ED_{i,t}$ = equivalent dividends on share i within the period t (where applicable).

The equivalent dividend is a measure developed by De Villiers (1980) to take into account the effect of capital structure changes on the return of a share without the need to adjust the actual values of the time series of share prices. This method was used by Du Plessis (1984) in his research and later published by De Villiers (1988). The method was also used in this study to generate share returns. On inspection of the share returns a number of anomalies were noticed. It was found that the formulae suggested by De Villiers (1988) did not cope with situations of simultaneous or near-simultaneous announcements of capital structure changes and an improvement is developed below.

Capital structure changes usually occur in isolation. If more than one capital structure change, however, occurs within a return period (a week or a month), the calculation for the equivalent dividend may be in error if De Villiers's (1988) formulae are used. In analysing capital structure changes on the Johannesburg Stock Exchange it was found that in some instances companies declared a capitalisation issue and subsequently consolidated or split their shares. Another occurrence of a simultaneous capital structure change was the announcement of a simultaneous share split and consolidation of shares. This usually occurred when a single announcement would have led to a fractional ratio in the split or consolidation announcement.

(a) *Simultaneous split and consolidation of shares*

For a share split De Villiers (1988) found that the equivalent dividend may be determined by using Equation 4.3, while the formula for the equivalent dividend for a consolidation of shares is represented by Equation 4.4.

$$ED_{i,t} = P_{i,t}(r_s - 1) \qquad \ldots(4.3)$$

$$ED_{i,t} = P_{i,t}\left(\frac{1}{r_c} - 1\right) \qquad \ldots(4.4)$$

where

$ED_{i,t}$	=	equivalent dividend per share resulting from a capital structure change during period t for share i;
$P_{i,t}$	=	price of share i at the end of period t;
r_s	=	number of shares into which a single share has been split during period t; and
r_c	=	number of shares consolidated into a single share during period t.

If a company were to announce a simultaneous share split of r_s shares for one share and a consolidation of shares of one share for r_c shares, it is clear that for each share that the shareholder held prior to the announcement, it would end holding r_s/r_c after both announcements. Thus it is established that

$$V_{i,t-1} = P_{i,t-1} \qquad \text{...(4.5)}$$

and

$$V_{i,t} = \frac{r_s}{r_c} \cdot P_{i,t} \qquad \text{...(4.6)}$$

where

$V_{i,t-1}$ = value in the possession of a shareholder that owns one share i at the beginning of period t. This includes the price of one share i plus any amount that the shareholder will invest in period t as a result of owning the share i; and

$V_{i,t}$ = value in the possession of the shareholder (who owned one share at the beginning of period t) at the end of the period t. This includes the value of all the shares he now owns plus the value of any other investment he has obtained plus any dividend received.

De Villiers's (1988) generalised equation for equivalent dividends is given below as Equation 4.7.

$$ED_{i,t} = \frac{P_{i,t-1} \cdot V_{i,t}}{V_{i,t-1}} - P_{i,t} \qquad \text{...(4.7)}$$

Substituting Equations 4.5 and 4.6 into this equation and simplifying yields:

$$ED_{i,t} = P_{i,t} \cdot \left(\frac{r_s}{r_c} - 1\right) \qquad \text{...(4.8)}$$

where the symbols are as defined before. Equation 4.8 is in a generalised form and provides for both share splits (r_c = 1) and consolidation of shares (r_s = 1) or a combination of the two.

(b) *Simultaneous capitalisation issues and consolidation or split of shares*

If a capitalisation issue of r_d shares per share held, is issued, De Villiers (1988) found that the equivalent dividend to represent this capital structure change is given by Equation 4.9.

$$ED_{i,t} = r_d \cdot P_{i,t} \qquad \text{...(4.9)}$$

where

r_d = number of shares issued as a capitalisation issue during period t per share held at the beginning of the period and all other symbols as defined before.

If such a capitalisation issue is followed by a consolidation of shares at one share for every r_c shares held (after the capitalisation issue), the value in possession of the shareholder per share is as follows:

$$V_{i,t-1} = P_{i,t-1} \qquad \text{...(4.10)}$$

and

$$V_{i,t} = \frac{1 + r_d}{r_c} \cdot P_{i,t} \qquad \text{...(4.11)}$$

Substituting into Equation 4.7 and simplifying yields:

$$ED_{i,t} = \left(\frac{1 + r_d}{r_c} - 1\right) \cdot P_{i,t} \qquad \text{...(4.12)}$$

where all symbols are as defined before.

If such a capitalisation issue is followed by a share split of r_s shares for every one share held (after the capitalisation issue), the value in possession of the shareholder per share at time t is as follows:

$$V_{i,t} = r_s \cdot (1 + r_d) \cdot P_{i,t} \qquad \text{...(4.13)}$$

Substituting into Equation 4.7 and simplifying yields:

$$ED_{i,t} = \left[r_s \cdot (1 + r_d) - 1\right] \cdot P_{i,t} \qquad \text{...(4.14)}$$

where all symbols are as defined before.

If it is desirable to keep the equivalent dividend due to the capitalisation issue separate from the equivalent dividend due to the consolidation of shares, this can only be achieved by expressing the one change in capital structure in terms of the share price prior to the change, and the other in terms of the share price after the change. This in turn requires the simplifying assumption that the value in possession of the shareholder immediately prior to the change is equal to the value in possession of the shareholder immediately after the change. It is then possible to express the share price after the change in terms of the share price before the change, as follows:

$$V_{i,t-1} = V_{i,t} \qquad \text{...(4.15)}$$

Hence:

$$1 \times P_{i,t-1} = (1 + r_d) \times P_{i,t} \qquad \text{...(4.16)}$$

and the equivalent dividend due to the capitalisation issue reduces to:

$$ED_{i,t} = \frac{r_d}{1 + r_d} \cdot P_{i,t-1} \qquad \text{...(4.17)}$$

It must be emphasised that the simplifying assumption assumes a zero return for the capitalisation issue which is not necessarily correct.

All other equivalent dividends as given by De Villiers (1988) are correct and will not be repeated here.

4.3.3.2 *Market return*

The market is usually represented by some form of an index. The only publicly available indices in South Africa are the JSE Actuaries' Indices. Affleck-Graves and Blomerus (1987) were critical about the use of a market capitalisations index such as one of the JSE Actuaries' Indices. They found that this type of index produced significantly lower beta estimates, that it was less stable, and had worse predictive abilities than three other index constructs. The stability and predictive ability differences were, however, not statistically significant. Since no other type of index is publicly available, and researchers have continued to use the market capitalisations indices (Bradfield, Barr & Affleck-Graves, 1988; Bhana, 1989), it was decided to use one of these indices nevertheless.

In choosing the appropriate index to represent the market, one could use the Overall Index or the Industrial Index. Since the Mining and Financial sections of the JSE have a considerable influence on the value of the Overall Index, and because this study is limited to industrial companies, the Industrial Index and its associated dividend yield were used as a proxy for the market. The market returns were calculated using the following construction of share price and dividend indices.

$$R_{m,t} = \left(\frac{I_{m,t} - I_{m,t-1}}{I_{m,t-1}}\right) + \left(\frac{DI_{m,t}}{100} \times \frac{n}{365}\right) \qquad \ldots(4.18)$$

where $R_{m,t}$ = realisable return on the Industrial Index in period t;

$I_{m,t}$ = value of the Industrial Index at the end of period t;

$DI_{m,t}$ = dividend index of the Industrial Index (expressed as a percentage) at the end of period t; and

n = number of days between the end of period t end the end of period t−1.

4.3.3.3 *Residual returns*

Using the market model (Equation 4.1) to estimate the regression parameters, $\hat{\alpha}_i$ and $\hat{\beta}_i$, the security's residual return is determined by Equation 4.19.

$$e_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}) \qquad \ldots(4.19)$$

where $e_{i,t}$ = residual from the estimated regression line, and all other symbols are as defined before.

In estimating the regression parameters, $\hat{\alpha}_i$ and $\hat{\beta}_i$, the customary period (Biddle & Lindahl, 1982: 562; Beaver, Christie & Griffin, 1980: 141) of 60 months (5 years) centred on the announcement date was used. Since the announcement was on 28 March 1984, the period for which the regression parameters were estimated, stretched from 30 September 1981 up to 1 October 1986. The parameters were estimated using bi-weekly returns, similar to the studies reported by Du Plessis, Archer and Affleck-Graves (1986) and Ooms, Archer and Smit (1987).

Knight and Affleck-Graves (1983) excluded the return data for 35 weeks before and 35 weeks following the announcement of a change to LIFO in estimating their regression parameters. Subsequently they only focused on the residual returns of the 10 weeks prior to the announcement week, the announcement week itself and the following 10 weeks. Resulting from this approach, it was decided to exclude 21 weeks of return data, centred on the week of the announcement of the abolition of the LIFO tax concession, in the estimation of the market model parameters. The period for which return data was excluded ran from 11 January 1984 to 6 June 1984. In this process the long-term relationship between $R_{i,t}$ and $R_{m,t}$ is not obscured by the likely unusual price behaviour at the time surrounding the announcement. Subsequently weekly residual returns were calculated for the 21-week exclusion period and these residuals were subjected to statistical testing.

4.3.4 Statistical tests

The residual returns for each security in each sample were calculated for each week in the exclusion period. For each sample the average residual return was calculated for each week in the exclusion period using Equation 4.20.

$$AR_t = \frac{1}{n}\sum_{i=1}^{n} e_{i,t} \qquad \ldots(4.20)$$

where AR_t = average residual return for a sample in week t, with t = −10 to +10, and where t = 0 is the week of the announcement;

n = number of securities contributing to the average residual return during week t;

and the other variables are as defined before.

In order to establish whether the share market displayed an extraordinary or abnormal behaviour during week t, the null hypothesis which states that the average residual in week t is zero, is tested. The test statistic for this test is given in Equation 4.21.
and the other variables as defined before.

$$t_{ARt} = \frac{AR_t}{s_{AR}} \qquad \ldots(4.21)$$

where t_{ARt} = test statistic, distributed according to the t-distribution; and
s_{AR} = estimated standard deviation of AR_t.

The estimation of the standard deviation, s_{AR}, needed careful consideration. In their evaluation of event study methodologies, Brown and Warner (1980; 1985) used two estimates of the standard deviation. The one estimate was based on the dispersion of the individual residual terms of each security and is well defined in most event studies. When serious dependency is expected amongst the residuals, for example industry effects, or event clustering, they used a standard deviation which allowed for a crude dependence adjustment. Since this study contained a clustering of event dates due to the single announcement, it seemed appropriate to use the standard deviation which allows for the crude dependence adjustment (Brown & Warner, 1980: 251). This standard deviation, which is the standard deviation of the average residuals rather than the average standard deviation, was estimated using the average weekly residual returns over all securities in the sample for the 50 weeks prior to the exclusion period. This lead to Equation 4.22 which follows below.

$$s_{AR} = \sqrt{\frac{1}{49}\{\sum_{t=-60}^{-11}[(\frac{1}{n}\sum_{i=1}^{n} e_{i,t}) - \frac{1}{50n}(\sum_{t=-60}^{-11}\sum_{i=1}^{n} e_{i,t})]^2\}} \qquad \ldots(4.22)$$

For hypothesis testing over a longer period, for example the full exclusion period, the cumulative average residual (CAR) must be determined for that period. The null hypothesis which states that the CAR over the appropriate test period is zero, was tested using the test statistic described in Equation 4.23.

$$t_{CAR} = \frac{\sum_{t=t_1}^{t_2} AR_t}{\sqrt{t_2 - t_1 + 1}.(s_{AR})} \qquad \ldots(4.23)$$

where t_1 and t_2 are the numbers of the start and end weeks respectively, between which the average residuals are accumulated, and the other symbols are as defined before.

A further test to determine whether a significant difference between the average residuals of the three samples existed, is also required. In comparing the average residuals of a LIFO change sample with that of a no-change sample, Ricks (1982) and Murray (1983) used Wilcoxon signed rank tests because of the matched pair designs that they used. For his random control group comparison with the LIFO adoption group, Murray (1983) used a Mann-Whitney U test. Ooms, ***et al.*** (1987) used the Jonckheere-Terpstra test (Daniel, 1978: 207-210) to detect significant differences in CAR performance between various portfolios. Although this nonparametric test is useful in detecting differences in a particular direction, it is doubtful whether one can apply this test to CAR performance, since one of the assumptions of the test is that the observations (i.e. CARs for subsequent periods) are independent. By design the CARs of subsequent periods depend on each other. It is, however, a useful test to apply to the average residuals of each period. Because the alternative hypothesis of the test for a significant difference between the mean residuals of the samples did not include a direction, and because there were three samples involved, the Kruskal-Wallis test (Conover, 1980: 229-231) was used.

In order to make the interpretation of the results of the statistical test employed meaningful, it is necessary to provide a few details of the tests used. The Kruskal-Wallis test is a nonparametric one-way analysis of variance test which is used to test the following hypothesis (Conover, 1980: 229-237):

H_0 : All of the *k* population distributions functions are identical

H_1 : The *k* populations do not all have identical means

The test statistic T is defined as:

$$T = \frac{1}{S^2}\left(\sum_{i=1}^{k}\frac{R_i^2}{n_i} - \frac{N(N+1)^2}{4}\right) \qquad \ldots(4.24)$$

$$\text{where } S^2 = \frac{1}{N-1}\left(\sum_{\text{rank }1}^{\text{rank }N} R(X_{i,j})^2 - N\frac{(N+1)^2}{4}\right); \qquad \ldots(4.25)$$

$$N = \sum_{i=1}^{k} n_i; \qquad \ldots(4.26)$$

$$R_i = \sum_{i=1}^{n_i} R(X_{i,j}) \qquad i = 1, 2, ..., k; \qquad ...(4.27)$$

$R(X_{i,j})$ = rank assigned to $X_{i,j}$; and

n_i = size of the ith sample.

The distribution of the test statistic, T, may be approximated by the χ^2-square distribution. If the null hypothesis is rejected, the sub-samples may be compared in pairs. It can be stated that population i and j seem to be different if the following inequality is satisfied:

$$\left| \frac{R_i}{n_i} - \frac{R_j}{n_j} \right| > t_{1-(\alpha/2)} \left(S^2 \frac{N-1-T}{N-k} \right)^{\frac{1}{2}} \left(\frac{1}{n_i} + \frac{1}{n_j} \right)^{\frac{1}{2}} \qquad ...(4.28)$$

where R_i and R_j are the rank sums of the two samples, $t_{1-\alpha/2}$ is the $(1 - \alpha/2)$ quantile of the t distribution with $N - k$ degrees of freedom (Conover, 1980:231).

The Jonckheere-Terpstra test has the same null hypothesis as the Kruskal-Wallis test, but instead of an alternative hypothesis which states that at least one mean is different, the alternative hypothesis states:

$$H_1 : \mu_1 \leq \mu_2 \leq ... \leq \mu_k$$

The test statistic is

$$J = \sum_{i<j} U_{i,j} \qquad ...(4.29)$$

where $U_{i,j}$ is the number of pairs of observations (a,b) for which $X_{i,a}$ is less than $X_{j,b}$. A one is recorded if the first observation is less than the second, else a nought is recorded. The order of the samples is thus important in this test. The J-statistic is compared with tabulated values, or approximated by a normal distribution (Daniel, 1978: 208).

4.4 RESULTS

The market model parameters were estimated from the return data and the beta values are reported in Appendix D.1 to D.3 for the three samples respectively, together with the t-statistic to test whether the betas were significantly different from zero. In a number of cases it was found that the betas were not significantly different from zero. This was usually due to infrequent trading. It was decided to remove the securities with betas that were not significant at the 5% level from the samples, reducing the LIFO sample to 71, the flip-flop sample to 23 and the control sample to 99 securities. It is interesting to note that the average beta for the LIFO sample is 0,791, that for the flip-flop sample is 0,999 and that for the control sample is 0,831. The results of a Kruskal-Wallis test for the equality of betas is reported in Table 4.1 together with the results of the multiple comparisons.

The tests indicate that at least one sample's mean beta is significantly different from the mean betas of the other samples. The multiple comparisons indicate that the flip-flop sample has a beta that is significantly different from the betas of the other two samples.

Table 4.1: Kruskal-Wallis analysis on equality of betas of samples

Sample	**Sample size**	**Average Rank**	
Control	99	96,77	
Flip-flop	23	127,67	
LIFO	71	87,39	
Test statistic T	9,040	p-value	0,011
Multiple comparisons			
Comparison	**LHS of (4.28)**	**RHS of (4.28)**	**Outcome**
Control−LIFO	9,387	16,707	No difference
Control−Flip-flop	30,928	24,867	Different
Flip-flop−LIFO	40,315	25,775	Different

The relatively low values of the sample betas seem to confirm the findings of Affleck-Graves and Blomerus (1987) who found low beta values with the use of a market capitalisations index as a proxy for the market. The difference in the mean beta values of the samples indicates that companies using the flip-flop method of inventory valuation displayed a significantly higher level of systematic risk. Since relative riskiness of the various portfolios is not of prime importance in this study, possible reasons for this difference in systematic risk will not be sought.

The residual returns for each security in each week of the exclusion period were subsequently determined. These were used to calculate the average residual for each week of the exclusion period for each sample. The average residuals were accumulated from the beginning of the exclusion period to the end of each week of this period to form the CARs for each sample. The CARs were plotted and are presented in Figure 4.1. From this figure one cannot distinguish any specific features, except that the flip-flop sample experienced an extended increase in residuals starting four weeks after the announcement of the abolition of the LIFO tax concessions. There were no abrupt changes in the residuals in the weeks surrounding the announcement.

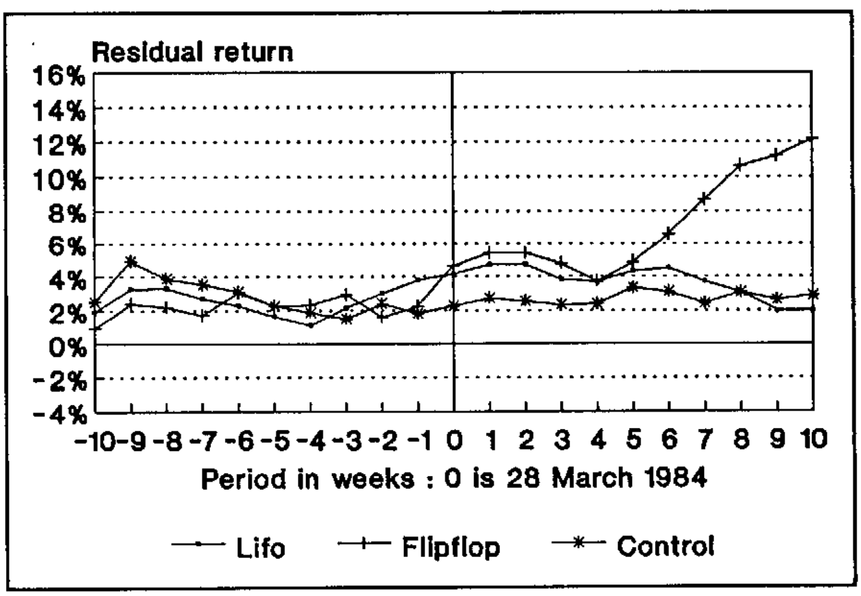

Figure 4.1: Cumulative average residuals: all securities

Attention was focused next on the individual average residuals that make up the CAR plots. Table 4.2 lists the average residuals for each sample together with their associated t-values, testing the hypothesis that the population mean residuals are zero, for each of the 21 weeks of the exclusion period.

Table 4.2 shows only four residuals that deviate significantly from zero at the 10% level. The residual of greatest interest is probably the 2,41% increase in return of the flip-flop sample in the week of the announcement. It has been hypothesised that a negative reaction could be anticipated due to the detrimental cash-flow effect that the abolition announcement contains. If investors were reacting to potential earnings effects, one would expect the LIFO sample to show a positive residual, and not the flip-flop sample. The positive residual for the flip-flop sample is thus counter intuitive and cannot be explained from the abolition announcement point of view. The lack of reaction of the LIFO sample is also most surprising. It could mean that the market had anticipated the announcement and that its effect had already been discounted.

The positive residuals for the LIFO and control samples in the first week (two weeks for the control sample) of the exclusion period (11 January 1984 to 18 January 1984) was also surprising. The flip-flop sample also experienced a positive residual, although this was not significant. The weekly financial newspapers during the first weeks of January were perused to determine whether there was some announcement that could have caused the abnormal behaviour during that week. Nothing could be established. This behaviour could be indicative of a January-effect (Foster, 1986: 357) on the JSE.

Having found little market reaction in the individual average residuals, multi-week intervals were scrutinised next. Table 4.3 shows the cumulative residuals over various intervals together with the associated t-statistics testing the null hypothesis that the CAR for the multi-week period is zero. It illustrates clearly that in none of the eight different multi-week intervals did the LIFO sample or the control sample display any abnormal behaviour. The only CARs that were significantly different from zero were those for the flip-flop sample for the full exclusion period and the second half of the exclusion period.

Table 4.2: Average residuals for the exclusion period: all securities with significant betas

	LIFO		Flip-flop		Control	
Week	AR	t-value	AR	t-value	AR	t-value
-10	1,93%	1,859[b]	0,97%	0,673	2,53%	1,879[b]
-9	1,36%	1,309	1,44%	1,001	2,41%	1,796[b]
-8	0,05%	0,046	-0,19%	-0,129	-1,06%	-0,787
-7	-0,62%	-0,593	-0,48%	-0,333	-0,34%	-0,252
-6	-0,43%	-0,418	1,30%	0,908	-0,41%	-0,307
-5	-0,62%	-0,593	-0,81%	-0,561	-0,86%	-0,642
-4	-0,55%	-0,527	0,09%	0,060	-0,36%	-0,266
-3	1,06%	1,016	0,60%	0,420	-0,38%	-0,282
-2	0,85%	0,814	-1,30%	-0,904	0,89%	0,659
-1	0,77%	0,743	0,62%	0,433	-0,56%	-0,414
0	0,36%	0,345	2,41%	1,681[b]	0,43%	0,317
1	0,57%	0,551	0,73%	0,510	0,44%	0,327
2	0,03%	0,028	0,01%	0,006	-0,16%	-0,120
3	-0,93%	-0,892	-0,60%	-0,418	-0,22%	-0,167
4	-0,14%	-0,135	-1,08%	-0,751	0,06%	0,042
5	0,65%	0,623	1,16%	0,807	0,95%	0,709
6	0,19%	0,183	1,64%	1,139	-0,24%	-0,178
7	-0,82%	-0,787	2,17%	1,510	-0,68%	-0,503
8	-0,61%	-0,582	1,93%	1,347	0,67%	0,496
9	-1,11%	-1,066	0,58%	0,405	-0,46%	-0,341
10	0,00%	0,001	0,96%	0,669	0,27%	0,201

[b] Indicates significance at the 10% level

All three periods contain the significant weeks +6 to +10 and are thus related. The abrupt increase in CAR from week +4 onwards, as illustrated in Figure 4.1, is thus shown to be significant. The other two significant exclusion periods also contain the significant residual of week 0.

Table 4.3: CARs for multi-week intervals: all securities with significant betas

Interval		LIFO		Flip-flop		Control	
From	To	CAR	t-value	CAR	t-value	CAR	t-value
-10	-6	1,67%	0,720	2,24%	0,697	2,27%	0,755
-10	0	4,16%	1,207	4,66%	0,980	2,29%	0,513
-10	10	2,00%	0,420	12,17%	1,849[b]	2,91%	0,473
-5	0	1,87%	0,734	1,62%	0,461	-0,84%	-0,257
-5	5	2,05%	0,595	1,84%	0,387	0,22%	0,049
0	5	0,54%	0,212	2,63%	0,749	1,49%	0,452
0	10	-1,80%	-0,522	9,91%	2,082[a]	1,05%	0,236
6	10	-2,34%	-1,007	7,28%	2,268[a]	-0,44%	-0,145

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

Since no explanation for this abnormal behaviour of the flip-flop sample could be found, the contributions of the individual companies to the average residual were investigated. It was found that Kimet and Metro Corporation contributed similar amounts towards the residuals of weeks 0 and +6, +7 and +8. These residuals furthermore represented by far the largest contributions to the average residuals of the respective weeks and at the same time to the CARs for the periods that included these weeks. It was also established (De Goede, 1988) that Metro Corporation was a subsidiary of Kimet. One would thus expect that if Metro Corporation were experiencing a good financial year, that Kimet's financial results would follow suit. Investors would react, and one could expect both securities to perform well. Since the flip-flop sample is small, the effect of including both the holding company and the subsidiary turns out to be crucial. When either the residuals of Kimet or Metro Corporation were removed from the sample, the average residual in week 0 is no longer significant at the 10% level, nor were the CARs for any of the three multi-week periods that were previously significant. This indicates that substantial cross-holdings between companies may seriously affect the results of capital market research and that some method of controlling for these cross-holdings (which are substantial on the JSE) is necessary.

To determine whether the relative risk of the securities could shed any light on the absence of the expected reaction to the announcement of the abolition of the LIFO tax concessions, the three samples were split into high beta and low beta sub-samples. Securities with betas greater than 0,85 were considered high risk, while the samples with securities that had betas less than 0,85 were considered low risk. The value of 0,85 was chosen to yield sub-samples of approximately the same size. Due to the higher beta values of the flip-flop sample, these two sub-samples were not nearly the same size.

The CAR plots for the high risk and low risk securities are shown as Figure 4.2 and 4.3 respectively. The biggest difference in comparing these plots with Figure 4.1 is found for the flip-flop sub-samples. This could well be due to the small size of the two sub-samples (6 securities with beta < 0,85; 17 securities with beta > 0,85).

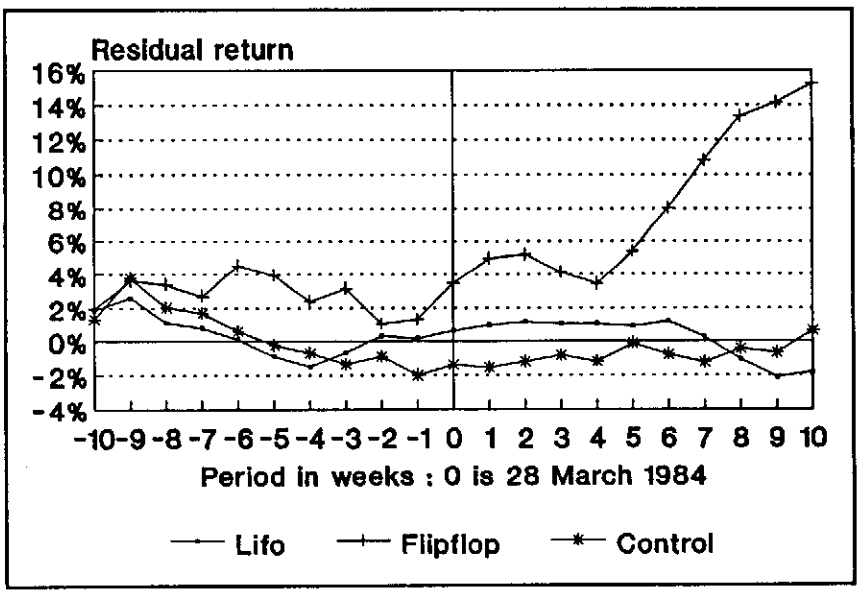

Figure 4.2: Cumulative average residuals: high risk securities (beta > 0,85)

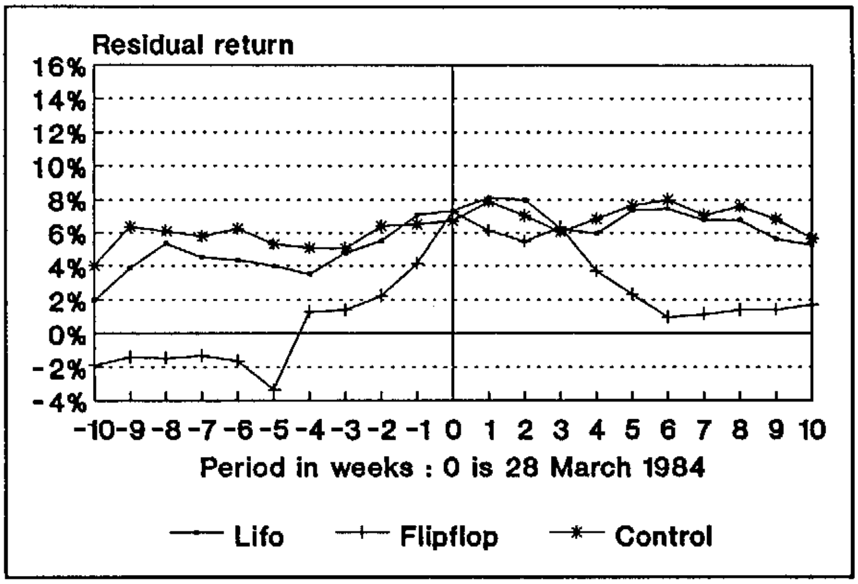

Figure 4.3: Cumulative average residuals: low risk securities (beta < 0,85)

The average residuals and CARs for multi-week periods for the low risk sub-samples are given in Tables 4.4 and 4.6, while the same results for the high risk sub-samples are given in Tables 4.5 and 4.7 respectively.

For the low risk samples the significance of the average residuals show little change from the full sample's significant weeks except in week −4 where the flip-flop sample became significant. Closer scrutiny of this average residual revealed that it was dominated by the residual of a single security that did not trade very frequently. If this single residual were to be considered as an outlier, the average residual would no longer be significant. The low risk securities also seem to dominate the abnormal behaviour that was detected in the first weeks of the exclusion period, with the LIFO sub-sample displaying similar residuals as the control sub-sample. Not a single average residual of any of the three high risk sub-samples was significant. The CAR values over the multi-week periods for the high risk sub-samples displayed exactly the same characteristics as the full samples' CARs, being dominated by the Kimet and Metro Corporation residuals. It is thus concluded that the relative risk has no influence on the behaviour of the securities around the time of the announcement of the abolition of the LIFO tax concessions. Knight and Affleck-Graves (1983) also did not find meaningful differences between high risk and low risk LIFO adopters.

Table 4.4: Average residuals for the exclusion period: all securities with betas < 0,85

	LIFO		Flip-flop		Control	
Week	AR	t-value	AR	t-value	AR	t-value
-10	1,98%	1,546	-1,87%	-1,067	4,00%	2,951[a]
-9	1,92%	1,499	0,44%	0,253	2,36%	1,742[b]
-8	1,50%	1,170	-0,06%	-0,034	-0,25%	-0,187
-7	-0,85%	-0,664	0,14%	0,081	-0,32%	-0,233
-6	-0,19%	-0,147	-0,31%	-0,175	0,45%	0,329
-5	-0,34%	-0,268	-1,70%	-0,967	-0,93%	-0,684
-4	-0,48%	-0,374	4,65%	2,649[a]	-0,22%	-0,160
-3	1,24%	0,971	0,09%	0,053	-0,03%	-0,024
-2	0,74%	0,581	0,86%	0,490	1,35%	0,993
-1	1,55%	1,215	1,90%	1,084	0,11%	0,083
0	0,26%	0,199	3,12%	1,779[b]	0,20%	0,145
1	0,77%	0,605	-1,13%	-0,644	1,16%	0,853
2	-0,12%	-0,091	-0,67%	-0,380	-0,85%	-0,625
3	-1,74%	-1,361	0,85%	0,482	-0,96%	-0,708
4	-0,28%	-0,223	-2,61%	-1,489	0,76%	0,563
5	1,40%	1,093	-1,40%	-0,796	0,80%	0,591
6	0,09%	0,073	-1,35%	-0,769	0,35%	0,257
7	-0,69%	-0,540	0,17%	0,098	-0,92%	-0,674
8	0,00%	0,003	0,27%	0,154	0,51%	0,375
9	-1,14%	-0,891	0,01%	0,004	-0,74%	-0,548
10	-0,35%	-0,273	0,30%	0,168	-1,16%	-0,852

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

Table 4.5: Average residuals for the exclusion period: all securities with betas > 0,85

	LIFO		Flip-flop		Control	
Week	AR	t-value	AR	t-value	AR	t-value
-10	1,89%	1,413	1,97%	1,138	1,34%	0,827
-9	0,73%	0,550	1,67%	0,967	2,46%	1,519
-8	-1,50%	-1,121	-0,23%	-0,133	-1,74%	-1,078
-7	-0,33%	-0,248	-0,69%	-0,396	-0,36%	-0,221
-6	-0,70%	-0,522	1,81%	1,045	-1,10%	-0,681
-5	-0,96%	-0,719	-0,60%	-0,345	-0,81%	-0,500
-4	-0,64%	-0,480	-1,52%	-0,881	-0,49%	-0,301
-3	0,85%	0,635	0,75%	0,436	-0,65%	-0,404
-2	0,98%	0,736	-2,11%	-1,218	0,47%	0,292
-1	-0,16%	-0,120	0,25%	0,142	-1,13%	-0,700
0	0,47%	0,351	2,19%	1,267	0,62%	0,385
1	0,35%	0,259	1,43%	0,828	-0,15%	-0,093
2	0,19%	0,145	0,25%	0,144	0,34%	0,210
3	-0,11%	-0,085	-1,05%	-0,609	0,40%	0,244
4	0,00%	-0,001	-0,70%	-0,402	-0,37%	-0,229
5	-0,15%	-0,113	1,96%	1,131	1,08%	0,669
6	0,30%	0,225	2,63%	1,521	-0,65%	-0,402
7	-0,98%	-0,733	2,79%	1,614	-0,48%	-0,296
8	-1,28%	-0,958	2,56%	1,480	0,80%	0,493
9	-1,07%	-0,805	0,78%	0,454	-0,23%	-0,140
10	0,30%	0,228	1,14%	0,658	1,27%	0,783

Table 4.6: CARs for multi-week interval: all securities with beta < 0,85

Interval		LIFO		Flip-flop		Control	
From	To	CAR	t-value	CAR	t-value	CAR	t-value
-10	-6	4,01%	1,402	-3,35%	-0,854	5,32%	1,752[b]
-10	0	7,32%	1,727[b]	7,27%	1,250	6,72%	1,494
-10	10	5,27%	0,900	1,71%	0,212	5,68%	0,914
-5	0	2,97%	0,949	8,93%	2,077[a]	0,48%	0,144
-5	5	3,00%	0,708	3,97%	0,682	1,39%	0,310
0	5	0,29%	0,091	-1,84%	-0,428	1,11%	0,334
0	10	-1,80%	-0,424	-2,44%	-0,420	-0,85%	-0,188
6	10	-2,08%	-0,728	-0,61%	-0,155	-1,96%	-0,645

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

Table 4.7: CARs for multi-week interval: all securities with beta > 0,85

Interval		LIFO		Flip-flop		Control	
From	To	CAR	t-value	CAR	t-value	CAR	t-value
-10	-6	-0,86%	-0,289	3,93%	1,017	-0,22%	-0,060
-10	0	0,63%	0,143	3,50%	0,609	-1,39%	-0,260
-10	10	-1,82%	-0,298	15,29%	1,929[b]	0,61%	0,082
-5	0	0,54%	0,164	-1,04%	-0,245	-1,98%	-0,501
-5	5	0,81%	0,183	0,85%	0,149	-0,69%	-0,129
0	5	0,74%	0,227	4,08%	0,964	1,92%	0,484
0	10	-1,99%	-0,448	13,99%	2,438[a]	2,62%	0,489
6	10	-2,73%	-0,914	9,90%	2,561[a]	0,71%	0,195

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

In order to test whether the mean weekly average residuals of the three samples differed materially, the hypothesis of equal mean weekly average residuals was tested using the Kruskal-Wallis test. The results are reported in Table 4.8. It is clear that no significant difference could be detected.

Table 4.8: Kruskal-Wallis analysis for equality of mean weekly average residuals

Sample	Average residual	Average Rank
Flip-flop	5,79%	37,952
Control	1,38%	29,191
LIFO	0,95%	28,857
Test statistic T = 3,325		
p-value = 0,190		

The Jonckheere-Terpstra test was also applied to the mean weekly average residuals to test all combinations of directional alternative hypotheses. These results are shown in Table 4.9. From the results it seems as if the flip-flop sample could have a larger mean weekly average residual than the other two samples, but this result is also likely to be biased due to the double counting caused by the inclusion of both Kimet and Metro Corporation.

Table 4.9: Jonckheere-Terpstra analysis for equality of sample average residuals

Direction of alternate hypothesis	J-statistic	p-value
LIFO ≤ Control ≤ Flip-flop	788	0,055[b]
LIFO ≤ Flip-flop ≤ Control	667	0,528
Flip-flop ≤ LIFO ≤ Control	538	0,940
Flip-flop ≤ Control ≤ LIFO	535	0,945
Control ≤ LIFO ≤ Flip-flop	785	0,060[b]
Control ≤ Flip-flop ≤ LIFO	656	0,472

[b] Indicates significance at the 10% level

A possible reason for the lack of share market reaction to the announcement of the abolition of the LIFO tax concessions could be that the market had anticipated the announcement and that the effect had already been discounted by the market at the time of the announcement. Possible indicators of such an anticipation are the following. Firstly not one of the industrial companies that has a financial year-end of December changed their accounting policy regarding inventory valuation in 1983, although December is the second most popular month for a financial year-end. In both June 1983 and September 1983 at least one company still changed their inventory valuation policies to the LIFO method. This could indicate that by December 1983 the abolition announcement had already been anticipated. Furthermore it was reported that the Commissioner of Inland Revenue warned against the misuse of the LIFO tax concessions during the annual Financial Mail Investment Conference which was held in November 1983.

An alternative reason for the lack of share market reaction could be that the remainder of the Budget that brought the announcement contained other information that overwhelmed the abolition of the LIFO tax concession. The Budget of 1984 also brought increased company taxes as well as an effective abolition of the investment allowances (*Financial Mail*, 1984: 30). If these announcements were, however, unexpected, one would have expected a negative response for all three samples around week 0. This did not happen. One must then conclude that the information contained in the budget seems to have been anticipated by the investors at large.

A final reason for the apparent lack of share market reaction to the announcement could be due to the research design. If the impact of the lost LIFO tax concession is small, the method used to detect the possible abnormal behaviour may not be sensitive enough. In their extensive simulation of abnormal performance, Brown and Warner (1980: 215) found that the methodology used could distinguish an abnormal behaviour of 5% almost with certainty, but a 1% abnormal behaviour was only detected 22,8% of the times. If the market had reacted to the announcement, but the impact was limited to approximately 1%, the chances are good that the methodology used would not have been able to detect the abnormal behaviour. Knight and Affleck-Graves (1983: 32) indicated that the minimum reduction in earnings due to a change to LIFO was 4%, but the average was 19%. Even if it is assumed that the Knight and Affleck-Graves (1983) sample included mainly early adopters of LIFO and that they were likely to be those who would gain most in terms of cash-flow, it seems unlikely that the abnormal impact on earnings of the LIFO sample included in study would be much lower than 5%.

4.5 SUMMARY AND CONCLUSION

The purpose of the analysis contained in this chapter was to determine to what extent the share market reacted to the announcement by the Minister of Finance in his Budget Speech of 28 March 1984 that the tax concessions associated with the valuation of inventory using the LIFO method were to be abolished.

Three samples of industrial companies were investigated, one which used the LIFO method of inventory valuation, one which used the flip-flop method of inventory valuation, and one control group. No attempt was made to match the samples. It was expected that both the flip-flop and the LIFO companies would display a negative market reaction if the market reacted correctly to the increased tax burden and resultant reduced cash flow of these companies. If the market were sensitive only to the reported income, one would still expect a negative reaction for the flip-flop companies, but a positive reaction for the LIFO companies that reverted to a FIFO policy.

Residual returns were calculated for each security and average residuals were determined for each sample in each week of a 21 week exclusion period surrounding the date of announcement. Significant positive residuals were found in week −10 for the LIFO and control samples. This could not be explained in the context of the announcement, but could be a sign that there is a January-effect on the JSE. The significant positive residual for the flip-flop sample in the announcement week as well as the significant CAR over the second half of the exclusion period was also not as expected. It was found that the significance of these residuals could be due to the inclusion of a holding company and its subsidiary that performed well in the relatively small sample. The double counting that occurs when both a holding company and its subsidiary are included in a sample may well confound the results of event and information content studies. No further insight in the behaviour of the residuals could be gained by splitting the samples into high risk and low risk sub-samples.

The lack of reaction of the share market could well be due to the fact that the announcement had been anticipated. Since there is no apparent reaction in the share market to the announcement, it is impossible, as Knight and Affleck-Graves (1983: 24) point out, to make a statement regarding the efficiency of the JSE based on the results presented.

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CHAPTER FIVE

THE INCREMENTAL INFORMATION CONTENT OF INFLATION-ADJUSTED INCOME

5.1 INTRODUCTION

In Chapter Two the literature regarding the usefulness of inflation accounting data was reviewed. It was clear that one of the more popular research designs in evaluating the share markets' reaction to inflation accounting data was the incremental information content approach. In this approach the share return or the market model adjusted share return is the dependent variable in a multiple linear regression analysis which uses a historic cost income and an inflation-adjusted income as explanatory variables.

This research design was not only popular abroad, but it was also the design used in the only reported research on this topic in South Africa, performed by Du Plessis, Archer and Affleck-Graves (1986). They used estimated inflation-adjusted income data and found that in general the adjusted income data did not contain information over and above that which was contained in the historic income. The only exception was for companies that were severely affected by inflation. On close scrutiny of the research reported by Du Plessis, *et al.* (1986), it was, however, found that it contained a number of deficiencies which will be elucidated below.

Due to the popularity of the research design and the advantage of replicating and extending Du Plessis, *et al.*'s (1986) research, it was decided to use the same design to empirically evaluate the information content as well as the incremental information content of the inflation-adjusted income data generated by the inflation accounting models described in Chapter Three.

Christie (1987) has addressed a number of fundamental issues in this type of research and concluded that in a multiple regression analysis the variables should be selected on an ***a priori*** theory. Although the economic structure of Du Plessis, ***et al.***'s (1986) research is not ideal, use of the methodology has since still been reported (Darnell & Skerratt, 1989). In addition, for the benefit of systematic research, deficiencies in prior research should be corrected before proceeding. In this context a comment by Beaver (1987: 140) is appropriate: "Indeed, systematic alteration of research designs provides a control mechanism and facilitates comparison with previous research".

In the next section the deficiencies of Du Plessis, ***et al.***'s (1986) study will be summarised. The research design used will be described in detail in Section 5.3, while the results will be reported in Section 5.4. A number of concluding remarks follow in Section 5.5.

5.2 CRITIQUE ON PREVIOUS SOUTH AFRICAN STUDY

The research of Du Plessis, ***et al.*** (1986) contained a number of deficiencies which could have had an influence on their results. The deficiencies are summarised below, together with the methods used to correct them.

(a) Although they mentioned that their inflation-adjusted income data were based on AC201 (SAICA, 1978), they did not indicate what their assumptions were in using the AC201 model. This is also a deficiency in the work of Du Plessis (1984) on which the paper of Du Plessis, ***et al.*** (1986) is based. In Chapter Three it was found that the classification of accounting data as either monetary or non-monetary yielded interpretations of AC201 that differed significantly. In this research the specific treatment of all accounting data is given in detail in Chapter Three.

(b) In their research design, Du Plessis, ***et al.*** (1986) removed the data of companies that voluntarily published a supplementary current cost income statement in the year of this disclosure. In addition the data of all companies using the flip-flop method of LIFO inventory valuation were removed in the years that this method was used. It was felt that since these companies made some provision for, or disclosure of the effects of inflation, that the share market would evaluate them differently to those companies that did not make any provisions or disclosures. Yet companies that used the LIFO method of inventory valuation, which is a limited form of inflation accounting, seemed to have been retained in their sample (Du Plessis, ***et al.***, 1986: 2). In the current research a distinction will be made between companies that have disclosed some accounting information regarding inflation accounting and those that have not made any such disclosures.

(c) The Du Plessis, ***et al.*** (1986) study also suffered from a fair amount of survival bias in the sample selection. They only used companies that were listed continuously from 1973 to 1982. By design all companies that were the subject of a take-over or merger and ceased to exist in their original form, and companies that were delisted during that period were eliminated, as well as all newly listed companies. Part of their problem was due to the chosen research design, for which they required at least three years of share market data (implying four annual reports) in order to calculate cumulative abnormal returns. There was however no need to extend this basic three-year period to nine years. A minimum listing period of three years was required for inclusion in the current research.

(d) Du Plessis, ***et al.*** (1986: 3) used a two-stage regression analysis to counter the influence of the collinearity of their explanatory variables which they motivate as follows: "The two-stage regression approach, however, permits the determination of the incremental explanatory power of collinear variables". Christie, Kennelley, King and Schaefer (1984) clearly indicated that the orthogonalisation of variables, as was done in their two-stage regression analysis, did not get rid of the collinearity. Their two-stage regression analysis yielded exactly the same results as a multiple regression. Collinearity of variables is a data problem, yielding a possible understatement of significance levels. Since the same variable definition is used in this study, the collinearity problem still occurs in the full multiple linear regression. By employing a stepwise multiple linear regression it can, however, be determined which one of the explanatory variables is the better one prior to testing for incremental information content.

5.3 RESEARCH DESIGN

5.3.1 Sample selection

The research contained in this chapter is limited, as was Du Plessis, ***et al.***'s (1986), to companies listed in the industrial section on the Johannesburg Stock Exchange (JSE). The period over which the investigation is performed, stretched from 1975 to 1989. A motivation for this period was provided in Section 1.2 of Chapter One.

It was decided to exclude the following companies from the analysis.

(a) Foreign companies that have their head office outside South Africa. The tax structure for these companies may differ from those registered in South Africa, and they can be affected differently by foreign economic influences. An additional problem would be to choose an appropriate exchange rate to convert the accounting data to Rand-values where these were reported in the foreign currency. This is required since the share prices are quoted in Rand-values. Du Plessis, ***et al.*** (1986) did not exclude foreign companies.

(b) Investment companies. These companies hold as their only assets investments in other companies. They do not display the normal characteristics of an industrial company, namely fixed assets, inventory, debtors and creditors. The balance sheet of such companies is usually so sparse that inflation adjustments are difficult to make.

(c) All pyramid holding companies. If the holding company holds more than 50% of the issued share capital of the operating company, the holding company's income statement and balance sheet are usually identical, or almost identical to that of the operating company due to consolidated reporting. Du Plessis, ***et al.*** (1986) used a similar exclusion criterion. The importance of this exclusion is borne out by the findings of this research as reported in Chapter Four, Section 4.4 where it was established that the inclusion of both the operating company and its holding company in a sample could affect the statistical significance in an event study. Although the research documented in this chapter does not constitute an event study, the possibility of confounding the results due to double counting by the inclusion of both the holding company and the operating company does exist. Pyramid holding companies were located by perusing the "Nature of Business" and "Holding Company" sections for each company as published in various editions of the *Stock Exchange Handbook*.

(d) In order to control for the variation of inflation within a year, all companies selected should have the same year-end. The companies whose accounting data were captured in the database used, were cross-tabulated per year and year-end month. This is shown in Table 5.1. (For ease of reference, all tables have been placed at the end of this chapter.) It is clear that June has been the most popular reporting month over all the years. Hence it was decided to use only companies with a year-end of June. Du Plessis, ***et al.*** (1986) used an identical selection criterion. A similar criterion has been used in the research reported in the literature, where December was usually found to be the most popular month in the United States of America (Beaver, Griffin & Landsman, 1982; Freeman, 1983; McDonald & Morris, 1984; Morris & McDonald, 1986; Haw & Lustgarten, 1988).

(e) For each company selected, at least two annual reports are required. This is necessary in order to determine opening and closing values for accounting data. In addition, the companies thus selected should also have been listed continuously for at least two years prior to the first annual report to be used. The two year listing period is required in order to calculate the company's market beta. The minimum required period of listing is thus three years, whereas Du Plessis, ***et al.*** (1986) required a continuous period of listing from 1973 to 1982, nine years in total. This requirement thus reduces the survival bias compared with their research, but does not entirely remove it, due to the required minimum period of listing.

(f) Companies of which the listings were suspended for excessively long periods, or which traded very infrequently (less than 5 times in a two-year period) are excluded from this study. Without a reasonable frequency in trading it is not possible to make a reasonable estimate of a company's market beta.

(g) Companies that were moved from the industrial to non-industrial sections of the JSE are only included up to the point that they were moved. This requirement is necessary to keep the sample strictly limited to industrial companies only.

Delisted companies were included up to the time of delisting, while newly listed companies were included as soon as the requirements of *e* above were met. The above requirements reduced the number of companies in the sample to a maximum of 126 in 1976 and a minimum of 56 in 1989. A full list of all companies included for each year appears in Appendix E.

5.3.2 Inflation accounting models

The inflation accounting models used were described in detail in Chapter Three. For continuity and coherence a brief description of each one is provided here.

Two models are based on AC201 and differ with respect to the classification of monetary and non-monetary items. In Model AC201/1 all investments, loan levies and loans (asset) were considered to be monetary assets, while all preference shares, minority interest, convertible debentures and deferred taxation were considered to be non-monetary liabilities. This is the more pessimistic interpretation of AC201. The more realistic interpretation leads to Model AC201/2 in which all investments, loan levies and loans (assets) were classified as non-monetary assets. Convertible preference shares, minority interest, convertible debentures and deferred taxation were considered to be non-monetary liabilities.

In the CRUDE/1 model, the inflation adjustment of historic cost income is equal to the average of the opening and closing values of shareholders' funds multiplied by the increase in the consumer price index (CPI). In the CRUDE/2 model the equity adjustment used in the CRUDE/1 model is reduced by the unrealised holding gain on fixed assets.

5.3.3 Accounting variables

Two accounting variables are used in this study. They are based on the historic cost income and inflation-adjusted income attributable to ordinary shareholders.

Historic cost income was defined as the earnings available to ordinary shareholders including the earnings of associated companies, based on the consolidated net income for the financial period, after ordinary and deferred taxation, and after deducting outside shareholders' interest and preference dividends, but excluding extraordinary and abnormal items. This definition differs slightly from Du Plessis, ***et al.*** (1986) in that they excluded deferred taxation and the earnings of associated companies. Deferred taxation is normally declared as part of the total taxation expense in determining the income after taxation, while it is felt that the exclusion of associated companies' earnings yields an income amount that is too conservative.

In defining the accounting variables to be used, two issues need to be addressed. The first is the expectations model to be used, and the second is the definition of an appropriate deflator of the accounting data to make them comparable between companies.

In most documented research where share market behaviour is explained by using accounting variables, a model for the expected value of the accounting variable in question is required. It is generally stated that the share market reacts to unexpected changes in accounting data. In some instances in research regarding accounting income data, analysts' forecasts have been used as the expectations model. In most research (for example, Beaver, ***et al.*** (1982); Freeman, (1983) and Bublitz, Frecka and McKeown (1985)) a naive expectations model has been used. In such a model the last disclosed income becomes the expected value for the next income. Thus the historic cost variable for a particular year is the disclosed historic income minus the previous year's historic income. This definition was also used by Du Plessis, *et al.* (1986). Whether the market is really naive is an open question. The lack of a well defined expectations model could have an influence the results of the analysis, but this has been the problem of all researchers in the past.

The expectations model for the inflation-adjusted income is somewhat less trivial. If the inflation-adjusted income is not disclosed, what would the market's reasonable expectation of this income be? Morris and McDonald (1982) and Morris and McDonald (1986) used the last disclosed historic cost income as the expected value of the next inflation-adjusted income. Although this expectation is based on a disclosed value, it does seem to be very simplistic. In most of the other research reported (for example Beaver, *et al.* (1982); Murdoch, (1986)), the naive model as used for the historic cost variable was used. Since Du Plessis, *et al.* (1986) also used this naive model, it will also be used in the current research.

In order to make the accounting data between companies comparable, they are usually deflated by some other accounting variable. Since the variables are to be used in a multiple linear regression analysis, it is essential that they are of similar magnitude, or else the assumption of homoscedasticity (constant variance of the error term of the regression) may be violated. Beaver, *et al.* (1982) and Bublitz, *et al.* (1985) used, amongst others, historic cost income as a deflator. Since this value may become negative, all companies that reported a loss were discarded. This treatment of the variables has a built-in bias, and is not recommended. Book value of shareholders' equity has also been used as a deflator (Bublitz, *et al.*, 1985) as has total assets (Lustgarten, 1982). Although Christie (1987: 233) has since suggested that the market value of equity should be used as a deflator, book value of equity was also used as deflator in more recent research (Darnell & Skerratt, 1989: 127). To keep the variable design identical to that of Du Plessis, *et al.* (1986) it was decided to use net asset value as a deflator. The net asset value was defined in Chapter Three, Section 3.3.3.1 as a tight definition of the historic cost book value of shareholders' equity.

The historic cost income variable was thus defined as the annual change in historic income, deflated by an average net asset value.

$$HC_{i,T} = \frac{HI_{i,T} - HI_{i,T-1}}{\frac{1}{3}(NAV_{i,T} + NAV_{i,T-1} + NAV_{i,T-2})} \qquad \ldots(5.1)$$

where

$HC_{i,T}$	=	change in historic income of company i in year T;
$HI_{i,T}$	=	historic cost income of company i in year T; and
$NAV_{i,T}$	=	net asset value of company i in year T.

The subscript *T* is used to indicate a full year and to distinguish it from shorter periods indicated by subscript *t* as used in Equations 5.5 to 5.8.

The above definition requires three annual reports to extract the values required to determine the average net asset value. To keep the variable definition identical to that used by Du Plessis, *et al.* (1986), a slight adjustment is made for the first years of available data. Based on the accounting data in the first two annual reports, the historic cost variable is defined as:

$$HC_{i,T} = \frac{HI_{i,T} - HI_{i,T-1}}{\frac{1}{2}(NAV_{i,T} + NAV_{i,T-1})} \qquad \ldots(5.2)$$

The inflation-adjusted income variable was also defined as the annual change in inflation-adjusted income, deflated by an average net asset value.

$$CC_{i,T} = \frac{CCI_{i,T} - CCI_{i,T-1}}{\frac{1}{3}(NAV_{i,T} + NAV_{i,T-1} + NAV_{i,T-2})} \qquad \ldots(5.3)$$

where

$CC_{i,T}$	=	change in inflation-adjusted income of company i in year T;
$CCI_{i,T}$	=	inflation-adjusted income of company i in year T; and
$NAV_{i,T}$	=	net asset value of company i in year T.

Due to similar reasons as described for the historic cost variable, the definition of the inflation-adjusted variable is modified slightly for the first years of available data.

$$CC_{i,T} = \frac{CCI_{i,T} - CCI_{i,T-1}}{\frac{1}{2}(NAV_{i,T} + NAV_{i,T-1})} \qquad \ldots(5.4)$$

5.3.4 Share market variable

In Chapter Four, Section 4.3.2 the share market data and the verification thereof was discussed. In Section 4.3.3 details of the calculations to determine the share returns, the market return as well as the market model parameters were given. These will thus not be repeated here.

In order to evaluate company specific information contained in the share prices, market-wide effects were first removed using the well known Capital Asset Pricing Model:

$$R_{i,t} = \alpha_i + \beta_i R_{m,t} + \varepsilon_{i,t} \qquad \ldots(5.5)$$

where

$R_{i,t}$	=	price relative return on security i in period t;
$R_{m,t}$	=	return on the market in period t;
α_i and β_i	=	regression parameters for security i estimated using ordinary least squares;
$\varepsilon_{i,t}$	=	error return on security i in period t, where
$\varepsilon_{i,t}$	are	NID$(0,\sigma^2)$, i = 1 to n (normally distributed, independent

error terms with a mean of zero and a constant variance, σ^2).

The parameters α_i and β_i were estimated using fortnightly return periods over an interval of two years prior to an exclusion period over which the residual return was to be calculated. If, for example, the residual return for the year 30 June 1985 to 30 June 1986 was required, share and market returns were calculated on a fortnightly basis from 30 June 1983 to 30 June 1985. Using this set of return data, the market model parameters were estimated. The security's residual return was then determined using these estimated regression parameters as follows:

$$e_{i,t} = R_{i,t} - (\hat{\alpha}_i + \hat{\beta}_i R_{m,t}) \qquad \text{...(5.6)}$$

where

$e_{i,t}$ = bi-weekly residual from the estimated regression line for company i in period t;

and all other symbols are as defined before.

The residual returns were aggregated into annual measures to yield the cumulative abnormal return, as follows:

$$CAR_{i,T} = \sum_{t=1}^{n_T} e_{i,t} \qquad \text{...(5.7)}$$

where

$CAR_{i,T}$ = cumulative abnormal return of company i in financial year T, or alternative annual holding period;

n_T = number of intervals in year T;

and all other symbols are as defined before.

This design of CAR was used in order to replicate Du Plessis, ***et al.*** (1986). Its use has also been reported in other studies (Beaver, Clarke & Wright, 1979: 327). If return periods are short, the difference in the use between the additive model and the alternative, and mathematically correct, multiplicative model is likely to be insignificant (Beaver, *et al.*, 1979). The multiplicative form of the CAR is, however, closer related to the abnormal performance measure of Ball and Brown (1968). Its use has been reported more frequently and also more recently (Board & Day, 1989; Hopwood & Schaefer, 1989). It was thus decided to determine both the additive and multiplicative forms of the CAR measure and to compare them. If they are found to be different, the analysis will be based on the multiplicative form of CAR. For the purpose of replicating the Du Plessis, *et al.* (1986) study, however, the additive form of CAR will at least be used for the realistic inflation accounting model based on AC201, Model AC201/2. The multiplicative form of the CAR measure is given in Equation 5.8.

$$CAR_{i,T} = \left[\prod_{t=1}^{n_T} (1 + e_{i,t}) \right] - 1 \qquad \ldots(5.8)$$

where all variables are as defined before.

The CAR measure was calculated for each company in each of the years 1976 to 1989 over three different exclusion or holding periods. The first holding period was based on the financial year-end of the companies, and thus ran from 30 June of one year to 30 June of the next year. On the date of the year-end of the companies, no information has, however, been disclosed. In order to capture the information that could have been impounded by the release of the annual reports, a holding period three months later, namely 30 September of one year to 30 September of the next year, was defined. Du Plessis (1984: 82) reported that a substantial number of annual reports of June year-end companies had been published by 30 September. In the maintenance of the accounting database at the University of Stellenbosch Business School it has also been found that lately companies have been publishing their annual reports sooner than in the past. A similar three month delay was investigated by Bublitz, *et al.* (1985). In general all annual reports have been published six months after the companies' year-ends. Thus a third holding period was defined from 31 December of one year to 31 December of the next year. Since this holding period is midway between two annual reports, the likelihood of finding incremental information content for this holding period is not that high, but it has been included since Du Plessis, ***et al.*** (1986) also included this extreme holding period. It was, however, decided not to include the August, October and November holding periods that they investigated, since they found no differences between the results of those holding periods compared with the three selected holding periods. This meant that for each company three beta estimates had to be made for each year that it was included in this study. In addition six CAR measures (three additive and three multiplicative) had to be determined. For the first year of useable data, 1976, and the June holding period, market model parameters were thus estimated over the period 30 June 1973 to 30 June 1975, and the CAR measure was estimated over the period 30 June 1975 to 30 June 1976. In order to construct the associated accounting variables, the annual reports of 30 June 1975 and 30 June 1976 were required.

In order to avoid possible weekend effects, the regression parameters were estimated using fortnightly intervals starting on the first Tuesday two years prior to the holding period. For example, to estimate the CAR-values for the year 30 September 1979 to 30 September 1980, the regression parameters α_i and β_i were estimated over the two-year period from Tuesday, 4 October 1977 to Tuesday, 2 October 1979. This approach is identical to that used by Du Plessis, ***et al.*** (1986).

5.3.5 Statistical analysis

Since the market-wide effects have been removed, the $CAR_{i,T}$ variable described above should contain all the company specific information that has been impounded into its share price over an entire year. This variable will thus be used as the dependent variable in a multiple linear regression analysis. The historic income variable, $HC_{i,T}$, as well as the inflation-adjusted income variable, $CC_{i,T}$, will be used as independent variables, as follows:

$$CAR_{i,T} = \alpha_0 + \alpha_1 HC_{i,T} + \alpha_2 CC_{i,T} + u_{i,T} \qquad \ldots(5.9)$$

where

α_j	=	regression coefficients, j = 0, 1 and 2;
$u_{i,T}$	=	random disturbance variable of company i in year T which is assumed to be normally distributed, independent and with constant variance;

and all other variables are as defined before.

This equation can be estimated in cross-section or in time series. In a cross-sectional analysis the data is pooled across companies and the regression parameters are estimated using the pooled data. This approach assumes that there are no serious cross-sectional dependencies. If the data contains effects which are peculiar to specific industries or years or different sizes of companies or for combinations of these effects, cross-sectional dependency will exist. The result of this cross-sectional dependency is that the regression coefficients are biased, leading to an overstatement of the significance level of the test (Bernard, 1987: 35). Thus if cross-sectional dependency exists and regression coefficients are found to be significant (implying incremental information content), it could well be that they are in fact not significant.

If the equation is estimated in time series, it implies a regression for each company in the sample. This regression in turn assumes that the variance of the error term remains constant over time for each company. Bernard and Ruland (1987) attempted to overcome this potential problem by pooling the data of a number of companies per industry, and then performed the time series regression on the pooled industry data (which is assumed to have a constant variance over time). Although the time series regression seems more attractive than the cross-sectional regression, it requires long time series of data per company. If one then wants to control for the year-end as well, South African data would yield not more than 50 companies. In addition the (non-random) sample would suffer from a survival bias. For this reason a time series regression is not used.

In using the cross-sectional regression, a decision must be made regarding the pooling of the data. Since Du Plessis, *et al.* (1986) pooled all their data over all years to gain the advantage of more efficient estimates (Beaver, ***et al.***, 1982: 34), and found no incremental information content for the inflation-adjusted variable (except for a limited case), it was decided also to pool the data over all years. If the inflation-adjusted variable is found to contain incremental information, the analysis can be further extended to a regression of data pooled per year. If the inflation-adjusted income variable does not contain incremental information content, the control for the possible existence of cross-sectional dependency due to the year should not lead to a different conclusion.

If the variance of the error term, $u_{i,T}$, is not constant as assumed for Equation 5.9, the problem of heteroscedasticity occurs. In Chapter Six this problem is addressed in detail. If the ordinary least squares regression analysis is used on data that contains heteroscedasticity, the consequence is that "t and F tests are very much likely to exaggerate the statistical significance of the conventionally estimated parameters" (Gujarati, 1978 :199). Thus heteroscedasticity could become a problem if the null hypothesis of no incremental information content is rejected. To limit the potential problems due to heteroscedasticity, the scaling factor or deflator described in Section 5.3.3 was introduced. It is hoped that this scaling will be sufficient to limit the heteroscedasticity. Consequently no tests will be performed to test for heteroscedasticity. If it is found that the inflation-adjusted income variable contains incremental information content, the residuals of Equation 5.9 will be inspected graphically to judge whether heteroscedasticity could have been a problem.

Christie, ***et al.*** (1984) showed that if α_1 in Equation 5.9 is significantly different from zero, the historic cost income variable has incremental explanatory power over and above inflation-adjusted variable. If α_2 in Equation 5.9 is significantly different from zero, the inflation-adjusted income variable has incremental explanatory power over and above the historic cost income variable. Since the two income variables are likely to be collinear, significance levels could be understated (Gujarati, 1978:179), and one may conclude that a variable has no incremental explanatory power while in fact it has. A further problem that may occur, is that the overall regression may be significant, but that both α_1 and α_2 do not differ from zero. This would typically occur if HC and CC do not have incremental explanatory power over one another, but that each variable on its own would have explanatory power in a simple linear regression model.

In order to determine which one of HC and CC has the better explanatory power, and also whether either one has incremental explanatory power over the other, it was decided to perform a stepwise multiple linear regression on the pooled cross-sectional data. The stepwise procedure will help to identify which explanatory variable enters the regression first. The F-value to enter was set to 4,0 which is approximately equal to a significance level of 5 percent (depending on the degrees of freedom). If collinearity were to cloud the statistical inference in the full multiple regression, it is at least possible to determine which of the two explanatory variables is perceived to have more explanatory power.

In the regression analysis, the hypothesis testing concerns the significance of the coefficients of the explanatory variables. In all tests the null hypothesis states that the beta coefficient is equal to nought, with an alternative hypothesis that the coefficient is not equal to nought. Stated symbolically:

$$\mathbf{H_0}: \quad \alpha_i \quad = \quad 0$$
$$\mathbf{H_1}: \quad \alpha_i \quad \neq \quad 0$$

In the analysis of variance of the overall multiple regression, the F-test indicates significance of the full regression. Stated symbolically:

$$\mathbf{H_0}: \quad \alpha_1 \quad = \quad \alpha_2 \quad = \quad 0$$

H_1: at least one of α_1 or α_2 is not equal to zero.

In cases where collinearity is a data problem, one can expect to find that neither α_1 nor α_2 are significantly different from nought. If a single explanatory variable is used, either one of the two explanatory variables will be significant. In these cases the stepwise regression will indicate which explanatory variable enters the estimation equation first.

For the significance testing of the regression analyses that follow, no null or alternative hypotheses will be stated. For each analysis they conform to the statements above.

5.4 RESULTS

5.4.1 Introduction

The results of the statistical analyses will be reported and discussed for each accounting model separately. In Section 5.4.6 a number of general remarks about the results will be made. It was assumed that Du Plessis, *et al.* (1986) probably used a classification of accounting data similar to the classification that is used for accounting Model AC201/2, since it seemed to be more realistic than Model AC201/1. The results for Model AC201/2 will thus be reported before Model AC201/1 since it also serves the purpose of replicating Du Plessis, *et al.* (1986).

For ease of reference the tables containing the results have been placed after the text of the discussion. The tables contain the significance testing of the α-parameters of the regression equation, the F-test for the regression and the unadjusted r^2-value. As Bouwer (1990: 91) has indicated, this r^2-value is reported to indicate the percentage of the explained variation of the CARs. The Durbin-Watson statistic is also reported, and always displays satisfactory values, indicating no serial correlation in the data.

5.4.2 Model AC201/2

In Table 5.2 the results of the regression using all company-year data are shown. It can be seen that the HC-variable has significant explanatory power with respect to the share returns for all holding periods. The inflation-adjusted income variable does not feature in the stepwise regression, and as a result the HC-variable also has significant incremental explanatory power over the CC-variable. The coefficients of determination are, however, very small. The lowest r^2-value reported by Du Plessis, *et al.* (1986) was 0,05, while in this analysis the September holding period yields the best value of 0,029. Du Plessis, *et al.* (1986) also found that the r^2-values increased from the June holding period to the other holding periods, and attributed this to the fact that company results were only made public a fair amount of time after the annual year-end. In the current analysis the r^2-value only increased marginally from the June to September holding periods.

Du Plessis, ***et al.*** (1986) removed all company-year data from their sample where attempts were made to account for the effect of inflation, in order not to bias their study. Yet they seemed to have left companies that used the LIFO method of inventory valuation as well as those companies that accounted for additional depreciation charges in their sample. In this research the full sample was split into two parts, one containing company-year data of companies that seem to have made some attempt to account for the effect of inflation, and the remaining data in the other sub-sample. Companies were deemed to have made an attempt to account for the effect of inflation if they published supplementary current cost statements, or revalued their assets and accounted for additional depreciation charges, or if they used some form of LIFO inventory valuation. The regression results for the two sub-samples are given in Tables 5.3 and 5.4 respectively.

For companies that made no inflation adjustments, the results do not differ significantly from those reported in Table 5.2. From Table 5.4 it is clear that the CC-variable has more explanatory power than the HC-variable with respect to the share returns for companies that disclosed inflation adjustments, but that it does not contain any incremental explanatory power. What is more surprising is the decline of the r^2-value from 0,072 for the June holding period to a statistically insignificant number for the December holding period. This indicates that neither income variable has any explanatory power of share returns six months after the company year-ends.

Du Plessis, ***et al.*** (1986) did not report whether the beta-parameters of the CAPM that they used were significant. One assumes that the CAPM parameters were estimated and used whether they were significantly different from zero or not. If the parameters were not significant for a particular company or period, it indicates that for that particular company-period the CAPM is not well defined. It does not seem correct to use the residuals of an ill-defined model to determine the information content of certain variables. One could have evaluated market residuals (that is $R_{i,t} - R_{m,t}$) rather than the market model residuals as the dependent variable in the regression. It was, however, decided to extract from the total sample all the company-year data for which the associated market model beta-value was significantly different from zero. This resulted in a sub-sample of 711 company-year data points. The regressions reported in Tables 5.2 to 5.4 were repeated and are reported in Tables 5.5 to 5.7.

When no distinction is made between companies with or without some form of published inflation adjustment, it is clear from Table 5.5 that the relationship between the HC-variable and CAR is stronger. The coefficient of determination has improved from 0,029 to 0,054 for the September holding period and the best stepwise regression. From the full multiple regression it can be seen that the CC-variable still does not have any incremental explanatory power. This statement must, however, be qualified. The p-value for the incremental information content for the CC-variable and the September holding period is 0,125. This is not significant using conventional significance levels. Due to the collinearity of the HC-variable and the CC-variable this significance level could, however, be understated, and it may well be that with a different model description, the inflation-adjusted income has some, if little, incremental explanatory power with respect to the share returns.

From Table 5.6 it can be seen that the relationship between the HC-variable and the share return also seems stronger than that displayed in Table 5.3, due to the higher r^2-value of 0,062 for the September holding period. From the full multiple regression it seems as if the possible incremental information content of the CC-variable is also clouded due to the collinearity of the income variables (a p-value of 0,131 applies).

For those companies that did disclose some form of inflation adjustment, Table 5.7 presents a picture very similar to Table 5.4. The better income variable with respect to the explanatory power of the share returns is the CC-variable. It also displays the highest association for the June holding period, while there is no significant information content for the September or December holding periods.

It is also interesting to note that in Tables 5.3 and 5.6 the highest association between the income variable and the share return was found for the September holding period, while it declined towards the December holding period. A possible interpretation of this behaviour could be that by September most of the June year-end companies have published their annual reports and the share market has reacted to the information contained in them. By December too much other information has been impounded into the share price so that the association with the income data published some time before is no longer that strong. For the companies represented in Tables 5.4 and 5.7, however, the highest association is found for the June holding period. This could mean that the market has anticipated the inflation-adjusted income for these companies prior to the release of their annual reports. That would of course be an indication of an efficient market. One does, however, becomes somewhat puzzled as to why there should be no association between either of the income variables by the time that most annual reports have been published.

In order to determine whether the additive CAR and multiplicative CAR variables differed significantly (which should not occur if the intervals are small enough), they were subjected to a difference of means test for paired measures. The results are given in Table 5.8. In all three instances it was found that the two return models differed significantly. It was thus decided to repeat the analysis above while using the multiplicative form of CAR as the dependent variable instead of the additive form. In addition the other accounting models will only be analysed using the multiplicative CAR.

The results for the multiplicative form of the dependent variable are given in Tables 5.9 to 5.11 for all companies, and in Tables 5.12 to 5.14 for all companies with significant betas. The results are similar to those obtained from using the additive CARs. In general the r^2-values seem marginally higher.

For the companies with significant market model beta-values and no inflation adjustments as depicted in Table 5.13, the incremental information content of the CC-variable is now significant at the 10% level for the September holding period. Taken in conjunction with the collinearity problem, it seems safe to state that for those companies there is a little information contained in the inflation-adjusted accounting income which is not contained in the historic income. For companies with some form of adjustment for inflation, the results are as strange as those reported under the discussion of Tables 5.4 and 5.7 above.

In Tables 5.9 and 5.10 the CC-variable has an unexpected negative incremental information content. This negative effect could well be due to the collinearity of the CC and HC-variables (Hanke, Reitsch & Dickson, 1984: 233).

The results of these analyses indicate that there is not much difference between the additive and multiplicative CAR models. The multiplicative model is thus to be preferred because of the mathematically correct determination of the residual return. This model also yields the more significant results. As far as the information content of the inflation-adjusted income variable, traces of incremental information content over and above the historic income variable seem noticeable only for companies with significant market model betas and that have not made any attempts to quantify the effects of inflation. For companies that have made some attempt to counter the effects of inflation, the inflation-adjusted income is a better explanatory variable of the additive CAR variable than the historic income. It does, however, not hold for the multiplicative CAR model, nor does it contain any incremental information.

5.4.3 Model AC201/1

In Table 5.15 the results of the regression using all company-year data are shown. It can be seen that the HC-variable has significant explanatory power with respect to the share returns for all holding periods. For the December holding period the CC-variable exhibits a strange negative incremental information content over the HC-variable. In the full regression $\hat{\alpha}_1$ remains significant, indicating that the HC-variable has significant incremental explanatory power over CC. The r^2-values are, however, very small, indicating that very little of the variability in the share price residuals is explained by the income variables. As was found with the results for the AC201/2 model the r^2-value increases slightly from the June holding period to the September holding period.

As was done for the AC201/2 model, the full sample was subsequently divided into two sub-samples, one containing the data of companies that did not make any attempt to quantify the effects of inflation, and the second containing the data of those companies that seem to have made some attempt to account for the effect of inflation. The regression results for the two sub-samples are given in Tables 5.16 and 5.17 respectively.

For companies that made no inflation adjustments (as shown in Table 5.16), the results do not differ significantly from those reported in Table 5.15. The inflation-adjusted income variable again displays a surprising negative incremental information content, which could well be due to the collinearity of the HC and CC-variables.

From Table 5.17 it is clear that for companies that seem to have made some attempt to account for the effect of inflation, the CC-variable has significant explanatory power with respect to the share returns, but the HC-variable is not significant. The CC-variable, however, does not contain any incremental explanatory power. As was found for the AC201/2 model, AC201/1 also displays the surprising decline of the r^2-value from 0,064 for the June holding period to a statistically insignificant number for the December holding period.

When the results in Tables 5.15 to 5.17 are compared to those obtained for Model AC201/2, it can be seen that the two alternative interpretations of AC201 do not lead to vastly different information contents of the accounting income data. In the full multiple regression for companies using some form of inflation accounting as shown in Table 5.11 for Model AC201/2 and in Table 5.17 for Model AC201/1, the t-values for the incremental information content of the CC-variable are larger for the AC201/1 model for all holding periods, but still far from significant. This could possibly indicate that an even more pessimistic inflation-adjusted income variable (obtained, for example, if asset ages were not restricted to 5 years) could contain incremental information.

The sample was again reduced by discarding those companies that did not have a significant beta-parameter for the CAPM as was done for Model AC201/2. The regressions were repeated for those company-year data points associated with significant beta-values. These results are reported in Table 5.18 for all companies, and in Tables 5.19 and 5.20 for the sub-samples of companies with and without inflation adjustments.

The results reported in Table 5.18 are similar to those reported in Table 5.15. The coefficient of determination has almost doubled, but remains small. Only the HC-variable is included in the regression, indicating the association between the historic cost income and the share price residual. It is interesting to note that in Table 5.18 the CC-variable has incremental explanatory power over the HC-variable at the 10% significance level for the September holding period. It was mentioned previously that significance levels are understated when collinear explanatory variables are used in a regression. This result could thus indicate a stronger association than that reported. The fact that the this association is strongest for the September holding period could also be meaningful. The June holding period could be too soon after the official year-end to yield significant results, and by the December holding period too much other information may well have diminished the relative importance of the income data reported months earlier.

The results in Table 5.19 are very similar to those reported in Table 5.18. The CC-variable again seems to have incremental explanatory power over the HC-variable for the September holding period. This relationship could also be stronger than reported due to the collinearity of the HC- and the CC-variables. The findings regarding the potential incremental information content of the CC-variable are similar to those found for the AC201/2 model.

Table 5.20, like Table 5.17, indicates that for those companies that have made some provision for the effects of inflation, the CC-variable is a better explanatory variable of the share price residual than the HC-variable. This relationship is, however, only noticeable for the June holding period, and the CC-variable still does not contain any incremental explanatory power.

5.4.4 Model CRUDE/1

In Table 5.21 the results of the regression using all company-year data for Model CRUDE/1 are shown. It can be seen that the HC-variable has significant explanatory power with respect to the share returns for the June holding period, while the CC-variable is the better explanatory variable for the September and December holding periods. In the full regression for the June holding period $\hat{\alpha}_1$ remains significant, indicating that the HC-variable has significant incremental explanatory power over the CC-variable, but for the September and December holding periods $\hat{\alpha}_2$ remains significant, indicating that the CC-variable has incremental explanatory power over the HC-variable for those holding periods. The r^2-values are, however, very small, indicating that very little of the variability in the share price residuals is explained by the income variables. As was found for Models AC201/1 and AC201/2 the r^2-value increases from the June holding period to the September holding period.

The full sample was subsequently divided into two sub-samples, one containing the data of companies that did not make any attempt to quantify the effects of inflation, and the second containing the data of those companies that seem to have made some attempt to account for the effect of inflation. The regression results for the two sub-samples are given in Tables 5.22 and 5.23 respectively.

Table 5.22 presents a pattern of significant coefficients similar to that found in Table 5.21. For the full multiple regression and the December holding period, the incremental information content of the CC-variable is only significant at the 10% significance level. Due to the collinearity of the HC- and CC-variables, however, this significance level may well be understated. For those companies which have attempted to account for the effect of inflation in one way or another, Table 5.23 shows that for the CRUDE/1 model the CC-variable is the better explanatory variable of the share price residuals for both the September and December holding periods. Its incremental information content is, however, only noticeable for the December holding period where it is associated with a negative coefficient for the HC-variable. This change in sign may again be due to the collinearity of the explanatory variables. In addition, it can be seen that the r^2-value in Table 5.23 is the highest for the June holding period while in Tables 5.21 and 5.22 it was the highest for the September holding period.

As for the two AC201 models, the company-year data for companies which did not exhibit a significant market model beta-parameters were discarded and the regressions repeated.

These results are reported in Table 5.24 for all companies, and in Tables 5.25 and 5.26 for the sub-samples of companies without and with inflation adjustments.

The results in Table 5.24 are similar to those reported in Table 5.21. The HC-variable is the sole independent variable in the stepwise regression, and it contains incremental information over and above the CC-variable for the June holding period. This situation is reversed for the September and December holding periods, with the only difference being that for the December holding period neither accounting variable contains significant incremental information content.

For the June and September holding periods Tables 5.25 and 5.26 are similar to Tables 5.22 and 5.23, but for the December holding period they display some differences. In the stepwise regression for this holding period and companies without inflation adjustments, the HC-variable is significant, while the CC-variable is not. Neither accounting variable has incremental explanatory power over the other. For companies with some form of accounting for the effects of inflation, neither variable seems to contain any information for the December holding period.

5.4.5 Model CRUDE/2

The results of the regression analysis for all companies using the CRUDE/2 model is given in Table 5.27. The results are similar to those reported for the CRUDE/1 model. For the June holding period, the HC-variable is the only independent variable in the stepwise regression model and it also contains incremental information content over and above the CC-variable. This pattern is reversed for the September holding period for which the CC-variable is significant and contains incremental information over the HC-variable. For the December holding period both the HC- and CC-variables are significant, but their signs are reversed. This reversal of sign, which was also noted in Tables 5.9, 5.10 and potentially in Tables 5.23 and 5.26, is probably due to the collinearity of the two independent variables. In each instance this phenomenon occurred for those companies that made some attempt to account for the effect of inflation.

The sample was also subdivided in two sub-samples, one for companies that did not attempt to account for the effects of inflation (results reported in Table 5.28), and the other for companies that did make an attempt to account for the effects of inflation to some extent (results reported in Table 5.29). The results in Table 5.28 differ from those in Table 5.27 only for the December holding period where the CC-variable is the only explanatory variable in the stepwise regression. For those companies with some form of inflation adjustment, Table 5.29 indicates that only the CC-variable is significant in the stepwise regression for the June and September holding periods. For the December holding period, neither of the variables enters the regression equation, yet both are significant in the full multiple regression, again with opposite signs. This, too, is probably due to the collinearity of the explanatory variables.

As was done in the analysis for the other models, companies with non-significant beta-parameters were subsequently discarded from the sample and the analysis repeated. The results of the regression analyses are given in Table 5.30 for all companies, in Table 5.31 for all companies without any form of inflation adjustment, and in Table 5.32 for those companies with some form of inflation adjustment. The results in Table 5.30 are almost identical to those in Table 5.27, and thus need no further exposition.

Table 5.31, which depicts the results of companies with significant betas but which have not made any attempt to account for the effects of inflation, displays the reversal of sign between the independent variables that was also noticed in Table 5.27 for the December holding period. Closer investigation revealed that the two independent variables have a coefficient of determination of 0,98, indicating that they essentially measure the same entity. If the stepwise regression is performed manually, it shows that for the June holding period the HC-variable is the first to enter the regression, while for the December holding period the CC-variable enters the model first. For the September holding period the CC-variable is the only significant independent variable, and it also contains incremental information over the HC-variable. It should be noted, however, that the reversal in sign of the HC-variable is still present, although its coefficient is not significant at the 10% level.

From Table 5.32 it is clear that the CC-variable is the only explanatory variable for both the June and September holding periods. Like in Table 5.29, neither variable is incorporated in the model for the December holding period.

When the results for the two CRUDE inflation accounting models are compared, it is clear that they are very similar. For the June holding period the HC-variable seems to be more significant and it contains incremental information over the CC-variable, the only exception being the CRUDE/2 model for companies with some form of adjustment for the effects of inflation. For the September holding period this situation is reversed, with the CC-variable being the better explanatory variable. Incremental information content over the HC-variable is apparent in all the regression models except those companies with some form of adjustment for the effects of inflation. For the CRUDE/2 model the high collinearity between the HC- and CC-variables results in the reversal of sign between the explanatory variables and thus makes interpretation more difficult.

5.4.6 A comparison of the models

In comparing the results of the analyses presented, it can be seen that in general the results for companies with significant market model beta-parameters the r^2-values of the regressions are higher than for those regressions based on all the data. The patterns of significance in the data (however limited) also seem to be clearer for those companies. The comparison of the results will thus concentrate on the results for these companies.

The further subdivision of the results into the sub-samples for companies that have made some form of inflation-accounting disclosure and those that made no such disclosures also seems to have been useful. Although little difference is usually noticeable between the full samples' results and those for companies without inflation accounting disclosures, this is probably due to the size of the two sub-samples (the number of company-year data points analysed was 711 of which 129 were due to companies with some form of inflation adjustment). A final comparison may thus be limited to Tables 5.13, 5.19, 5.25 and 5.31 for those companies without some form of inflation adjustment, and Tables 5.14, 5.20, 5.26 and 5.32 for those companies with inflation adjustments.

Throughout the discussion of the results, reference was made to the collinearity of the explanatory variables. On the one hand the collinearity can lead to the understatement of significance levels, but on the other it can also lead to the strange reversal in sign of the explanatory variables. In the discussion of the CRUDE/2 model it was stated that the reversal in sign that was noticed was associated with a very high degree of correlation between the explanatory variables. It thus seems safe to assume that the potential incremental information content of the explanatory variables will only be apparent if the coefficients of the explanatory variables at least display the same sign.

In comparing the results for companies that have not disclosed any inflation adjustments, the CC-variable does not enter the stepwise regression, and thus does not display any incremental information content for the June holding period for all models (Model CRUDE/2 has the reversal of sign problem). For the September holding period, however, the CC-variable contains incremental information at the 10 percent significance level for the AC201 models, an for the CRUDE models it is used in the stepwise regression. For the CRUDE models in the full multiple regression the reversal of sign seems to be a problem. For the December holding period, no incremental information content is apparent for the CC-variable in any of the models. The coefficients of determination are always a maximum in the September holding period. In addition, the coefficients of determination are a little higher for the CRUDE models.

For the companies that have disclosed inflation-adjusted accounting data, a different pattern emerges. The highest correlations are found for the June holding period, and for the December holding period they are virtually non-existent. For the AC201/1 and CRUDE/2 models the CC-variable is used in the best stepwise regression, indicating that this variable contains more information than the HC-variable. For both CRUDE models a similar observation can be made with respect to the September holding period, but the r^2-value is much less than for the June holding period. In the full regressions no incremental information content can be found for the CC-variable.

A possible explanation for this behaviour could be that expectations are based on the historic cost information unless some form of adjustment for the effects of inflation is normally published. Thus, for the June holding period when annual reports have not yet been published, the HC-variable is most significant except for those companies with some form of inflation adjustment in which case the CC-variable is more significant. By September most of the annual reports of the June year-end companies have been published. The market has then in all likelihood made some form of crude inflation adjustment which is reflected in the more significant CC-variables for the September holding period. For those companies with published inflation adjustments the historic income and the adjusted income behave according to the expectations, and thus the annual reports add little information with regard to the inflation adjustments and hence the regression models are less significant for the September holding period. Six months after the year-end of the companies most of the information contained in the disclosed income data and possible adjustments made to them by the market have been disseminated, leading to less significant results for the December holding period.

The historic cost income displayed significance in many of the analyses, but since that value is not the objective of this study, it has not been discussed in detail in this summary. It is sufficient to state that the significance of even the historic cost income variables may be in doubt due to the possible cross-sectional dependencies and heteroscedasticity.

Although the research reported in this chapter does indicate that the crude inflation-adjusted income data contain significant information (for the September holding period), little of the variability of the residual share returns is explained by the income variables. This phenomena must, however, be qualified. One would expect a large amount of random behaviour in the share price residuals, since investors do not have the same expectations. Thus any information that can be used to describe the seemingly random behaviour of the share price residuals is useful information.

On the other hand one must also take into account the possible confounding effects that cross-sectional dependence and possible heteroscedasticity could have had on the results. It was stated in Section 5.3.5 that both these phenomena could lead to the over-statement of significance levels. The incremental information content of the CC-variable that was established was at best limited. In order to evaluate whether the possible cross-sectional dependency due to the pooling of the data over all years influenced the results, two of the analyses that produced the more significant results are repeated on an annual basis. For this purpose companies with significant market model beta-parameters and which did not disclose any inflation accounting adjustments are used. The inflation accounting Models AC201/2 and CRUDE/1 are analysed for the September holding period only. Ideally companies which disclosed some information regarding inflation accounting should also have been analysed on an annual basis, but unfortunately that sub-sample is too small to make the analysis meaningful. For the AC201/2 model results for the full multiple regression are shown in Table 5.33, while Table 5.34 depicts the step-wise regressions for those years where in Table 5.33 the F-test indicates that the model is significant. Similar results are reported for Model CRUDE/1 in Tables 5.35 and 5.36.

From Table 5.33 it can be seen that the HC-variable is significant in 6 of the 14 years (4 times at the 10% level), while the CC-variable is significant in 3 of the 14 years. This significance is an indication of the incremental information content of the variables. The signs of the coefficients do, however, indicate possible problems due to collinearity. The coefficients of determination vary from a low of 0,037 in 1985 to a high of 0,393 in 1984. The r^2-value for 1984 compares well with the maximum value of 0,346 reported by Bublitz, *et al.* (1985) in the year that they found incremental information content in the inflation-adjusted accounting data. The results for the stepwise regressions are reported in Table 5.34. From this table it can be gleaned that in 4 years, namely 1977, 1978, 1981 and 1984 the CC-variable was the better explanatory variable, while in the years 1976, 1979, 1980 and 1989 the HC-variable was the better explanatory variable. In 1981 the stepwise procedure was terminated after the inclusion of the first variable, since the HC-variable displayed an unexpected negative sign, probably due to the collinearity of the two explanatory variables.

The results for the annual regressions for the CRUDE/1 model as depicted in Tables 5.35 and 5.36 are somewhat more encouraging than those for Model AC201/2. In the full multiple regression the HC-variable is only significant at the 10% level in 2 of the 14 years, while the CC-variable is significant in 6 of the 14 years (4 times at the 10% significance level). In the stepwise regressions the CC-variable is the better explanatory variable in 5 of 14 the years, while the HC-variable is the better explanatory variable in 3 of the 14 years. The r^2-values are somewhat lower than those found in Tables 5.33 and 5.34.

From the analyses on an annual basis it is clear that the inflation-adjusted income variable is as good an explanatory variable of the annual cumulative residual return as the historic cost income variable, if not slightly better. The incremental information contents of the two variables also differ from year to year and there is no indication that the one variable outperforms the other in terms of its incremental information content. The fact that in 6 of the 14 years neither explanatory variable could explain a significant part of the share return residual, indicates that its relationship with the income data is not that strong.

5.5 SUMMARY AND CONCLUSIONS

In this chapter a number of deficiencies in the research of Du Plessis, *et al.* (1986), which up to now has been the only research in South Africa on the relationship between inflation-adjusted income and the behaviour of share prices, were highlighted. Their research design was then replicated on two clearly specified AC201 inflation-adjusted accounting income quantities as well as for two crudely adjusted income quantities for an extended period of 1976 to 1989.

The results indicate that the historic cost income is usually the better explanatory variable in describing the behaviour of share returns. As far as the information content of the inflation-adjusted income, incremental information content over and above the historic cost income seems to exist only for companies with significant market model betas and that have not made any attempts to quantify the effects of inflation by means of publishing supplementary current cost statements, writing off additional depreciation or employing some form of the LIFO inventory valuation. For companies that have made some attempt to quantify the effects of inflation, the inflation-adjusted income does not contain any incremental information. These results were confirmed by the various definitions of inflation accounting models.

The results do not differ much from those obtained by Du Plessis, ***et al.*** (1986), who also reported very limited incremental information content of the inflation-adjusted income data. This has also been the pattern in most published research regarding the information content of inflation-adjusted accounting information.

In the analysis on an annual basis for companies with significant market model beta-parameters, the historic cost income and the inflation-adjusted income do not outperform one another in describing the behaviour of share returns.

The results, or lack thereof, must however be qualified. The interpretation of AC201 may be incorrect, as may be some or all of the estimates that had to be made to determine the inflation-adjusted income quantities for the different models. The model defining the relationship between the share market variable and the accounting variables may have been defined incorrectly. In fact Christie (1987) emphasised the need to develop a model based on sound economic reasoning. The CAPM may also not be the correct model to extracting residual company return data. Page (1989) suggested that on the JSE a two-factor APT model may be better specified than the CAPM. In this research a pooled cross-sectional approach was followed. This could have led to cross-sectional dependencies due to year and industry dependency, with the result that the true relationships were difficult to detect. It was also assumed that the variance of the residual of the multiple regression model is constant. If this were not the case, the heteroscedasticity could lead to an exaggerated statement of the significance levels.

The possible problem areas listed above, taken together with the limited information content obtained for the inflation-adjusted accounting income, clearly indicate that more research is required.

In Chapter Six an alternative model, namely the income measurement perspective, will be used in an attempt to find a relationship between the inflation-adjusted accounting data and the behaviour of share prices.

Table 5.1: Number of companies per year-end month for each year 1975 to 1989

MONTH	**75**	**76**	**77**	**78**	**79**	**80**	**81**	**82**	**83**	**84**	**85**	**86**	**87**	**88**	**89**
January	2	2	2	2	2	2	2	2	1	0	0	0	0	1	1
February	44	43	43	40	37	42	43	37	33	27	29	28	43	94	103
March	45	44	44	43	48	43	39	43	39	39	39	43	45	61	62
April	6	6	5	4	3	3	3	7	7	2	2	2	3	4	5
May	1	1	1	1	1	1	1	2	3	4	1	2	2	1	1
June	166	155	143	132	126	119	109	105	98	95	94	88	108	139	137
July	2	2	2	1	1	1	1	1	1	1	1	1	1	4	3
August	4	4	4	3	5	4	5	4	5	5	6	5	14	21	19
September	20	21	21	17	17	19	24	30	30	29	28	30	30	31	30
October	2	2	2	2	1	1	1	1	1	0	0	0	0	0	0
November	4	4	4	4	3	3	3	3	3	3	2	3	3	3	2
December	81	79	73	71	72	72	67	65	65	68	65	74	84	91	88
TOTAL	**377**	**363**	**344**	**320**	**316**	**310**	**298**	**300**	**286**	**273**	**267**	**276**	**333**	**450**	**451**

Table 5.2: Information content of Model AC201/2 accounting income: all companies, additive CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,015	−0,009	0,006	−0,014	−0,007	0,007
t-value	−0,795	−0,655	−0,457	−0,765	−0,508	0,488
$\hat{\alpha}_1$ [HC]	0,409	0,349	0,319	0,400	0,306	0,308
t-value	5,168[a]	5,831[a]	5,067[a]	4,389[a]	4,450[a]	4,257[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	0,014	0,065	0,016
t-value				0,212	1,260	0,302
F-test	26,708[a]	34,000[a]	25,670[a]	13,365[a]	17,807[a]	12,870[a]
r^2	0,023	0,029	0,022	0,022	0,030	0,021
Durbin-Watson	2,004	1,977	1,986	2,004	1,974	1,986
D.O.F.	1 139	1 139	1 139	1 138	1 138	1 138

The following key holds for all tables:

a	Denotes significance at the 5% level
b	Denotes significance at the 10% level
NS	Denotes not significant at at least the 10% level
D.O.F.	Denotes degrees of freedom

Table 5.3: Information content of Model AC201/2 accounting income: all companies with NO inflation adjustments, additive CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,005	−0,001	0,019	−0,005	0,001	0,020
t-value	−0,264	−0,071	1,154	−0,248	0,067	1,182
$\hat{\alpha}_1$ [HC]	0,388	0,340	0,317	0,383	0,301	0,306
t-value	4,604[a]	5,500[a]	4,830[a]	3,983[a]	4,271[a]	4,088[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	0,008	0,061	0,017
t-value				0,115	1,156	0,308
F-test	21,201[a]	30,245[a]	23,329[a]	10,596[a]	15,796[a]	11,701[a]
r^2	0,021	0,030	0,023	0,020	0,031	0,023
Durbin-Watson	2,125	1,970	1,992	2,025	1,969	1,992
D.O.F.	973	973	973	972	972	972

Table 5.4: Information content of Model AC201/2 accounting income: all companies WITH inflation adjustments, additive CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,067	−0,055	−0,061	−0,072	−0,050	−0,060
t-value	−2,023[a]	−1,635	−1,834[b]	−2,066[a]	−1,435	−1,712[b]
$\hat{\alpha}_1$ [HC]	NS	NS	NS	0,289	−0,312	−0,105
t-value				0,456	−0,487	−0,165
$\hat{\alpha}_2$ [CC]	0,870	0,618	NS	0,633	0,874	0,488
t-value	3,562[a]	2,507[a]		1,102	1,507	0,846
F-test	12,688[a]	6,284[a]		6,417[a]	3,246[a]	1,347
r^2	0,072	0,037	0,000	0,067	0,033	0,010
Durbin-Watson	1,836	1,746	1,790	1,845	1,745	1,790
D.O.F.	164	164	165	163	163	163

Table 5.5: **Information content of Model AC201/2 accounting income: all companies with significant betas, additive CARs**

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,055	−0,047	−0,034	−0,055	−0,043	−0,032
t-value	−2,696[a]	−2,999[a]	−2,220[a]	−2,648	−2,713[a]	−2,063[a]
$\hat{\alpha}_1$ [HC]	0,570	0,445	0,351	0,561	0,292	0,275
t-value	6,266[a]	6,377[a]	5,205[a]	3,528[a]	2,392[a]	2,330[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	0,009	0,167	0,083
t-value				0,067	1,537	0,791
F-test	39,526[a]	40,666[a]	27,094[a]	19,603[a]	21,553[a]	13,853[a]
r^2	0,052	0,054	0,037	0,051	0,056	0,036
Durbin-Watson	2,074	2,070	1,833	2,074	2,063	1,828
D.O.F.	709	709	709	708	708	708

Table 5.6: **Information content of Model AC201/2 accounting income: significant beta companies, NO inflation adjustments, additive CARs**

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,042	−0,035	−0,018	−0,042	−0,030	−0,016
t-value	−1,784[b]	−1,989[a]	−1,082	−1,757[b]	−1,714[b]	−0,934
$\hat{\alpha}_1$ [HC]	0,556	0,448	0,361	0,556	0,294	0,282
t-value	5,645[a]	6,178[a]	5,170[a]	3,269[a]	2,355[a]	2,342[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	0,000	0,169	0,086
t-value				0,002	1,511	0,804
F-test	31,865[a]	38,163[a]	26,723[a]	15,905[a]	20,266[a]	13,676[a]
r^2	0,052	0,062	0,044	0,051	0,062	0,044
Durbin-Watson	2,133	2,164	1,860	2,133	2,159	1,855
D.O.F.	580	580	580	579	579	579

Table 5.7: Information content of Model AC201/2 accounting income: significant beta companies, WITH inflation adjustments, additive CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,107	−0,096	−0,098	−0,114	−0,097	−0,096
t-value	−3,116[a]	−2,720[a]	−2,813[a]	−3,157[a]	−2,600[a]	−2,613[a]
$\hat{\alpha}_1$ [HC]	NS	NS	NS	0,437	0,065	−0,079
t-value				0,666	0,096	−0,119
$\hat{\alpha}_2$ [CC]	0,758	NS	NS	0,405	0,375	0,341
t-value	3,126[a]			0,696	0,628	0,578
F-test	9,771[a]			5,086[a]	1,474	0,639
r^2	0,071	0,000	0,000	0,075	0,023	0,010
Durbin-Watson	1,888	1,925	1,877	1,890	1,926	1,877
D.O.F.	127	128	128	126	126	126

Table 5.8: Statistical test for the difference between multiplicative and additive CARs

Holding period	**Jun**	**Sep**	**Dec**
μ_d	−0,032	−0,019	−0,036
t-value	−2,410[a]	−2,806[a]	−2,026[a]
D.O.F.	1141	1141	1141

Table 5.9: Information content of Model AC201/2 accounting income: all companies, multiplicative CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,017	0,008	0,025	0,015	0,007	0,025
t-value	1,008	0,552	1,002	0,846	0,496	1,002
$\hat{\alpha}_1$ [HC]	0,403	0,405	0,769	0,460	0,422	0,769
t-value	5,597[a]	6,453[a]	6,283[a]	5,555[a]	5,843[a]	6,283[a]
$\hat{\alpha}_2$ [CC]	NS	NS	−0,457	−0,086	−0,025	−0,457
t-value			−4,969[a]	−1,387	−0,470	−4,969[a]
F-test	31,329[a]	41,641[a]	22,048[a]	16,639[a]	20,917[a]	22,048[a]
r^2	0,027	0,035	0,037	0,028	0,035	0,037
Durbin-Watson	1,938	1,919	2,001	1,938	1,919	2,001
D.O.F.	1 139	1 139	1 138	1 138	1 138	1 138

Table 5.10: Information content of Model AC201/2 accounting income: all companies with NO inflation adjustments, multiplicative CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,026	0,014	0,037	0,023	0,012	0,037
t-value	1,387	0,843	1,265	1,205	0,770	1,265
$\hat{\alpha}_1$ [HC]	0,380	0,392	0,769	0,440	0,412	0,769
t-value	5,057[a]	6,097[a]	5,853[a]	5,133[a]	5,617[a]	5,853[a]
$\hat{\alpha}_2$ [CC]	NS	NS	−0,459	−0,093	−0,031	−0,459
t-value			−4,679[a]	−1,446	−0,561	−4,679[a]
F-test	25,571[a]	37,179[a]	19,404[a]	13,846[a]	18,734[a]	19,404[a]
r^2	0,026	0,037	0,038	0,028	0,037	0,038
Durbin-Watson	1,954	1,917	2,001	1,955	1,918	2,001
D.O.F.	973	973	972	972	972	972

Table 5.11: Information content of Model AC201/2 accounting income: all companies WITH inflation adjustments, multiplicative CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,047	−0,020	NS	−0,042	−0,023	−0,032
t-value	−1,215	−0,531		−1,070	−0,587	−0,908
$\hat{\alpha}_1$ [HC]	0,965	NS	NS	0,609	0,204	−0,030
t-value	3,162[a]			0,849	0,283	−0,046
$\hat{\alpha}_2$ [CC]	NS	0,685	NS	0,356	0,517	0,396
t-value		2,463[a]		0,548	0,791	0,675
F-test	9,997[a]	6,066[a]		5,127[a]	3,056[a]	1,106
r^2	0,057	0,036	0,000	0,059	0,036	0,013
Durbin-Watson	1,743	1,562		1,733	1,563	1,792
D.O.F.	164	164	165	163	163	163

Table 5.12: Information content of Model AC201/2 accounting income: all companies with significant betas, multiplicative CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,024	−0,035	−0,026	−0,025	−0,030	−0,024
t-value	−1,427	−2,301[a]	−1,738[b]	−1,502	−1,998[a]	−1,586
$\hat{\alpha}_1$ [HC]	0,500	0,436	0,412	0,561	0,272	0,334
t-value	6,766[a]	6,484[a]	6,085[a]	4,346[a]	2,317[a]	2,826[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	−0,067	0,179	0,084
t-value				−0,580	1,705[b]	0,798
F-test	45,772[a]	42,037[a]	37,022[a]	23,033[a]	22,528[a]	18,820[a]
r^2	0,061	0,056	0,049	0,061	0,060	0,050
Durbin-Watson	1,977	1,955	1,769	1,977	1,949	1,765
D.O.F.	709	709	709	708	708	708

Table 5.13: Information content of Model AC201/2 accounting income: significant beta companies, NO inflation adjustments, multiplicative CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,009	−0,025	−0,013	0,011	−0,020	−0,011
t-value	−0,499	−1,506	−0,789	0,588	−1,200	−0,646
$\hat{\alpha}_1$ [HC]	0,491	0,433	0,424	0,556	0,263	0,344
t-value	6,212[a]	6,222[a]	5,989[a]	4,076[a]	2,192[a]	2,819[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	−0,071	0,186	0,088
t-value				−0,058	1,746[b]	0,802
F-test	38,594[a]	38,712[a]	35,868[a]	19,445[a]	20,949[a]	18,244[a]
r^2	0,062	0,063	0,062	0,063	0,067	0,059
Durbin-Watson	2,061	2,070	1,831	2,061	2,066	1,828
D.O.F.	580	580	580	579	579	579

Table 5.14: Information content of Model AC201/2 accounting income: significant beta companies, WITH inflation adjustments, multiplicative CARs

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,094	NS	NS	−0,091	−0,079	−0,076
t-value	−2,949[a]			−2,752[a]	−2,150[a]	−2,189[a]
$\hat{\alpha}_1$ [HC]	0,718	NS	NS	0,490	0,456	−0,069
t-value	2,898[a]			0,822	0,684	−0,110
$\hat{\alpha}_2$ [CC]	NS	NS	NS	0,223	0,072	0,323
t-value				0,422	0,121	0,582
F-test	8,398[a]			4,260[a]	1,818	0,674
r^2	0,062	0,000	0,000	0,063	0,028	0,011
Durbin-Watson	1,916			1,915	1,942	1,906
D.O.F.	127	128	128	126	126	126

Table 5.15: Information content of Model AC201/1 accounting income: all companies

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,017	0,008	0,026	0,015	0,008	0,026
t-value	1,008	0,552	1,039	0,878	0,542	1,039
$\hat{\alpha}_1$ [HC]	0,403	0,405	0,707	0,442	0,407	0,707
t-value	5,597[a]	6,453[a]	5,890[a]	5,449[a]	5,756[a]	5,890[a]
$\hat{\alpha}_2$ [CC]	NS	NS	−0,383	−0,062	−0,003	−0,383
t-value			−4,332[a]	−1,034	−0,049	−4,332[a]
F-test	31,328[a]	41,642[a]	19,035[a]	16,200[a]	20,804[a]	19,035[a]
r^2	0,027	0,035	0,032	0,028	0,035	0,032
Durbin-Watson	1,938	1,919	2,001	1,938	1,919	2,001
D.O.F.	1 139	1 139	1 138	1 138	1 138	1 138

Table 5.16: Information content of Model AC201/1 accounting income: all companies with NO inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,026	0,014	0,038	0,023	0,013	0,038
t-value	1,387	0,843	1,303	1,231	0,815	1,303
$\hat{\alpha}_1$ [HC]	0,380	0,392	0,708	0,423	0,398	0,708
t-value	5,057[a]	6,097[a]	5,495[a]	5,044[a]	5,535[a]	5,495[a]
$\hat{\alpha}_2$ [CC]	NS	NS	−0,387	−0,071	−0,009	−0,387
t-value			−4,099[a]	−1,153	−0,168	−4,099[a]
F-test	25,571[a]	37,179[a]	16,812[a]	13,454[a]	18,585[a]	16,812[a]
r^2	0,026	0,037	0,033	0,027	0,037	0,033
Durbin-Watson	1,954	1,917	2,001	1,954	1,917	2,001
D.O.F.	973	973	972	972	972	972

Table 5.17: Information content of Model AC201/1 accounting income: all companies WITH inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,030	−0,018	−0,028	−0,036	−0,020	−0,028
t-value	−0,811	−0,474	−0,820	−0,905	−0,501	−0,772
$\hat{\alpha}_1$ [HC]	NS	NS	NS	0,292	0,112	−0,235
t-value				0,443	0,169	−0,394
$\hat{\alpha}_2$ [CC]	0,899	0,694	NS	0,670	0,606	0,599
t-value	3,346[a]	2,565[a]		1,150	1,033	1,137
F-test	11,198[a]	6,578[a]		5,670[a]	3,283[a]	1,529
r^2	0,064	0,039	0,000	0,065	0,039	0,018
Durbin-Watson	1,711	1,563	1,804	1,720	1,564	1,795
D.O.F.	164	164	165	163	163	163

Table 5.18: Information content of Model AC201/1 accounting income: all companies with significant betas

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,024	−0,035	−0,026	−0,025	−0,030	−0,024
t-value	−1,427	−2,301[a]	−1,839[b]	−1,509	−1,960[b]	−1,573
$\hat{\alpha}_1$ [HC]	0,500	0,436	0,412	0,560	0,275	0,339
t-value	6,766[a]	6,484[a]	6,085[a]	4,494[a]	2,427[a]	2,970[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	−0,066	0,177	0,080
t-value				−0,597	1,773[b]	0,796
F-test	45,772[a]	42,037[a]	37,022[a]	23,043[a]	22,654[a]	18,818[a]
r^2	0,061	0,056	0,050	0,061	0,060	0,050
Durbin-Watson	1,977	1,955	1,769	1,977	1,949	1,766
D.O.F.	709	709	709	708	708	708

Table 5.19: Information content of Model AC201/1 accounting income: significant beta companies, NO inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,009	−0,025	−0,013	−0,012	−0,020	−0,011
t-value	−0,499	−1,506	−0,789	−0,615	−1,172	−0,649
$\hat{\alpha}_1$ [HC]	0,491	0,433	0,424	0,565	0,268	0,356
t-value	6,212[a]	6,222[a]	5,989[a]	4,292[a]	2,315[a]	3,014[a]
$\hat{\alpha}_2$ [CC]	NS	NS	NS	−0,082	0,183	0,076
t-value				−0,705	1,786[b]	0,726
F-test	38,594[a]	38,712[a]	35,868[a]	19,529[a]	21,024[a]	18,183[a]
r^2	0,062	0,063	0,058	0,063	0,068	0,059
Durbin-Watson	2,060	2,070	1,831	2,060	2,066	1,828
D.O.F.	580	580	580	579	579	579

Table 5.20: Information content of Model AC201/1 accounting income: significant beta companies, WITH inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,080	−0,063	−0,072	−0,085	−0,078	−0,072
t-value	−2,598[a]	−1,798[b]	−2,219[a]	−2,570[a]	−2,095[a]	−2,066[a]
$\hat{\alpha}_1$ [HC]	NS	NS	NS	0,223	0,387	−0,215
t-value				0,414	0,641	−0,380
$\hat{\alpha}_2$ [CC]	0,653	NS	NS	0,482	0,138	0,464
t-value	3,061[a]			1,037	0,265	0,951
F-test	9,367[a]			4,739[a]	1,847	0,958
r^2	0,069	0,000	0,000	0,070	0,028	0,015
Durbin-Watson	1,898	1,964	1,932	1,901	1,942	1,903
D.O.F.	127	128	128	126	126	126

Table 5.21: Information content of Model CRUDE/1 accounting income: all companies

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,012	0,015	0,048	0,007	0,015	0,052
t-value	0,723	1,024	1,888[b]	0,410	0,954	1,946[b]
$\hat{\alpha}_1$ [HC]	0,528	NS	NS	0,746	0,004	−0,206
t-value	6,538[a]			2,744[a]	0,017	−0,506
$\hat{\alpha}_2$ [CC]	NS	0,588	0,685	−0,233	0,584	0,885
t-value		8,254[a]	5,573[a]	−0,839	2,436[a]	2,140[a]
F-test	42,748[a]	68,125[a]	31,062[a]	21,721[a]	34,033[a]	15,649[a]
r^2	0,036	0,056	0,027	0,037	0,056	0,027
Durbin-Watson	2,360	2,280	2,166	2,358	2,280	2,165
D.O.F.	1 138	1 138	1 138	1 137	1 137	1 137

Table 5.22: Information content of Model CRUDE/1 accounting income: all companies with NO inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,021	0,018	0,059	0,017	0,018	0,061
t-value	1,120	1,177	2,055[a]	0,868	1,099	2,010[a]
$\hat{\alpha}_1$ [HC]	0,505	NS	NS	0,697	0,013	−0,091
t-value	5,952[a]			2,355[a]	0,052	−0,198
$\hat{\alpha}_2$ [CC]	NS	0,579	0,689	−0,205	0,566	0,778
t-value		7,847[a]	5,122[a]	−0,678	2,199[a]	1,657[b]
F-test	35,422[a]	61,574[a]	26,230[a]	17,931[a]	30,757[a]	13,122[a]
r^2	0,035	0,060	0,027	0,036	0,060	0,026
Durbin-Watson	2,340	2,230	2,134	2,341	2,295	2,134
D.O.F.	972	972	972	971	971	971

Table 5.23: Information content of Model CRUDE/1 accounting income: all companies WITH inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,047	−0,005	−0,023	−0,070	−0,010	0,010
t-value	−1,215	−0,142	−0,689	−1,572	−0,219	0,242
$\hat{\alpha}_1$ [HC]	0,965	NS	NS	1,645	0,136	−1,006
t-value	3,162[a]			2,275[a]	0,187	−1,562
$\hat{\alpha}_2$ [CC]	NS	0,723	0,566	−0,705	0,607	1,424
t-value		2,506[a]	2,202[a]	−1,037	0,886	2,349[a]
F-test	9,997[a]	6,278[a]	4,849[a]	5,539[a]	3,137[a]	3,665[a]
r^2	0,057	0,037	0,029	0,064	0,037	0,043
Durbin-Watson	2,236	2,238	2,067	2,171	2,231	2,090
D.O.F.	164	164	164	163	163	163

Table 5.24: Information content of Model CRUDE/1 accounting income: all companies with significant betas

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,024	−0,025	−0,017	−0,023	−0,023	−0,019
t-value	−1,427	−1,640	−1,115	−1,347	−1,489	−1,203
$\hat{\alpha}_1$ [HC]	0,500	NS	NS	0,492	−0,044	0,102
t-value	6,766[a]			2,044[a]	−0,202	0,462
$\hat{\alpha}_2$ [CC]	NS	0,481	0,439	0,009	0,525	0,339
t-value		6,904[a]	6,254[a]	0,035	2,311[a]	1,481
F-test	45,772[a]	47,659[a]	39,107[a]	22,854[a]	23,818[a]	19,638[a]
r^2	0,061	0,063	0,052	0,060	0,063	0,053
Durbin-Watson	2,233	2,150	2,261	2,233	2,150	2,258
D.O.F.	709	709	709	708	708	708

Table 5.25: Information content of Model CRUDE/1 accounting income: significant beta companies, NO inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,009	−0,016	−0,013	−0,009	−0,015	−0,010
t-value	−0,499	−0,970	−0,789	−0,476	−0,877	−0,549
$\hat{\alpha}_1$ [HC]	0,491	NS	0,424	0,487	−0,044	0,247
t-value	6,212[a]		5,989[a]	1,817[b]	−0,187	1,027
$\hat{\alpha}_2$ [CC]	NS	0,479	NS	0,004	0,523	0,194
t-value		6,594[a]		0,014	2,121[a]	0,772
F-test	38,594[a]	43,481[a]	35,868[a]	19,264	21,722[a]	18,220[a]
r^2	0,062	0,070	0,058	0,062	0,070	0,059
Durbin-Watson	2,230	2,190	2,280	2,300	2,190	2,288
D.O.F.	580	580	580	579	579	579

Table 5.26: Information content of Model CRUDE/1 accounting income: significant beta companies, WITH inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,094	−0,063	−0,071	−0,102	−0,068	−0,045
t-value	−2,949[a]	−1,818[b]	−2,219[a]	−2,800[a]	−1,657[b]	−1,176
$\hat{\alpha}_1$ [HC]	0,718	NS	NS	0,966	0,156	−0,804
t-value	2,898[a]			1,657[b]	0,240	−1,332
$\hat{\alpha}_2$ [CC]	NS	0,513	NS	−0,254	0,382	1,092
t-value		2,002[a]		−0,470	0,633	1,952[b]
F-test	8,397[a]	4,006[a]		4,283[a]	2,017	2,423[b]
r^2	0,062	0,031	0,000	0,064	0,031	0,037
Durbin-Watson	2,035	2,131	1,965	2,028	2,129	1,980
D.O.F.	127	127	128	126	126	126

Table 5.27: Information content of Model CRUDE/2 accounting income: all companies

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,012	0,008	0,057	0,007	0,015	0,057
t-value	0,723	0,515	2,157[a]	0,376	0,992	2,157[a]
$\hat{\alpha}_1$ [HC]	0,528	NS	−1,774	1,108	−0,753	−1,774
t-value	6,538[a]		−2,329[a]	2,168[a]	−1,703[b]	−2,329[a]
$\hat{\alpha}_2$ [CC]	NS	0,598	2,512	−0,607	1,366	2,512
t-value		8,259[a]	3,189[a]	−1,149	2,988[a]	3,189[a]
F-test	42,748	68,213[a]	18,511[a]	22,040[a]	35,613[a]	18,511[a]
r^2	0,036	0,057	0,032	0,037	0,059	0,032
Durbin-Watson	2,360	2,277	2,157	2,359	2,279	2,157
D.O.F.	1 138	1 138	1 137	1 137	1 137	1 137

Table 5.28: Information content of Model CRUDE/2 accounting income: all companies with NO inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	0,021	0,013	0,052	0,013	0,018	0,069
t-value	1,120	0,795	1,794[b]	0,648	1,104	2,276[a]
$\hat{\alpha}_1$ [HC]	0,505	NS	NS	1,354	−0,554	−1,638
t-value	5,952[a]			2,449[a]	−1,180	−1,915[b]
$\hat{\alpha}_2$ [CC]	NS	0,581	0,707	−0,889	1,148	2,380
t-value		7,803[a]	5,207[a]	−1,554	2,363[a]	2,692[a]
F-test	35,422[a]	60,889[a]	27,111[a]	18,945[a]	31,153[a]	15,427[a]
r^2	0,035	0,059	0,027	0,038	0,060	0,031
Durbin-Watson	2,340	2,296	2,131	2,338	2,300	2,126
D.O.F.	972	972	972	971	971	971

Table 5.29: Information content of Model CRUDE/2 accounting income: all companies WITH inflation adjustments

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,039	−0,026	−0,028	−0,030	−0,003	−0,008
t-value	−1,038	−0,680	−0,820	−0,758	−0,071	−0,232
$\hat{\alpha}_1$ [HC]	NS	NS	NS	−0,943	−2,408	−3,006
t-value				−0,714	−1,831[b]	−2,570[a]
$\hat{\alpha}_2$ [CC]	1,090	0,911	NS	2,048	3,358	3,619
t-value	3,436[a]	2,859[a]		1,486	2,445[a]	2,963[a]
F-test	11,802	8,175[a]		6,139[a]	5,822[a]	5,311[a]
r^2	0,067	0,047	0,000	0,070	0,067	0,061
Durbin-Watson	2,227	2,183	2,085	2,214	2,138	1,986
D.O.F.	164	164	165	163	163	163

Table 5.30: Information content of Model CRUDE/2 accounting income: all companies with significant betas

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,024	−0,031	−0,009	−0,031	−0,022	−0,009
t-value	−1,427	−2,051[a]	−0,608	−1,811[b]	−1,424	−0,608
$\hat{\alpha}_1$ [HC]	0,500	NS	−1,344	1,288	−0,860	−1,344
t-value	6,766[a]		−2,936[a]	2,553[a]	−1,880[b]	−2,936[a]
$\hat{\alpha}_2$ [CC]	NS	0,480	1,855	−0,832	1,369	1,855
t-value		6,853[a]	3,878[a]	−1,579	2,865[a]	3,878[a]
F-test	45,772[a]	46,969[a]	26,396[a]	24,180[a]	25,336[a]	26,396[a]
r^2	0,061	0,062	0,069	0,064	0,067	0,069
Durbin-Watson	2,233	2,156	2,268	2,223	2,164	2,268
D.O.F.	709	709	708	708	708	708

Table 5.31: **Information content of Model CRUDE/2 accounting income: significant beta companies, NO inflation adjustments**

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,021	−0,021	0,002	−0,021	−0,014	0,002
t-value	−1,071	−1,271	0,115	−1,071	−0,781	0,115
$\hat{\alpha}_1$ [HC]	1,694	NS	−1,177	1,694	−0,777	−1,177
t-value	2,983[a]		−2,324[a]	2,983[a]	−1,554	−2,324[a]
$\hat{\alpha}_2$ [CC]	−1,271	0,473	1,691	−1,271	1,277	1,691
t-value	−2,140[a]	6,519[a]	3,191[a]	−2,140[a]	2,444[a]	3,191[a]
F-test	21,706[a]	42,498[a]	23,310[a]	21,706[a]	22,508	23,310[a]
r^2	0,070	0,068	0,075	0,070	0,072	0,075
Durbin-Watson	2,286	2,196	2,303	2,286	2,206	2,303
D.O.F.	579	580	579	579	579	579

Table 5.32: **Information content of Model CRUDE/2 accounting income: significant beta companies, WITH inflation adjustments**

	Best stepwise regression			Full multiple regression		
Holding period	**Jun**	**Sep**	**Dec**	**Jun**	**Sep**	**Dec**
$\hat{\alpha}_0$	−0,089	−0,077	−0,072	−0,080	−0,064	−0,057
t-value	−2,847[a]	−2,218[a]	−2,219[a]	−2,428[a]	−1,738[b]	−1,674[b]
$\hat{\alpha}_1$ [HC]	NS	NS	NS	−0,804	−1,251	−2,292
t-value				−0,784	−1,093	−2,161[a]
$\hat{\alpha}_2$ [CC]	0,818	0,644	NS	1,628	1,904	2,733
t-value	3,200[a]	2,250[a]		1,530	1,602	2,481[a]
F-test	10,243[a]	5,061[a]		5,413[a]	3,131[a]	3,605[a]
r^2	0,075	0,038	0,000	0,079	0,047	0,054
Durbin-Watson	2,062	2,140	1,965	2,076	2,161	2,024
D.O.F.	127	127	128	126	126	126

Table 5.33: **Annual regressions for Model AC201/2: September holding period, companies with significant beta and NO inflation adjustments**

Year	$\hat{\alpha}_1$[HC]	t-value	$\hat{\alpha}_2$[CC]	t-value	r^2	F-test	n
76	0,924	1,728[b]	0,122	0,298	0,081	3,387[a]	80
77	0,475	1,091	0,459	1,448	0,146	5,809[a]	71
78	−0,643	−0,380	3,527	2,308[a]	0,266	8,883[a]	52
79	1,326	1,707[b]	0,250	0,604	0,122	2,363	37
80	1,675	1,687[b]	0,665	0,947	0,254	6,295[a]	40
81	−2,671	−2,074[a]	3,491	3,100[a]	0,332	8,202[a]	36
82	−0,387	−0,551	−0,114	−0,196	0,100	1,447	29
83	−0,249	−0,201	0,554	0,411	0,061	0,916	31
84	−0,028	−0,095	0,706	2,716[a]	0,393	11,007[a]	37
85	0,117	0,425	0,150	0,850	0,037	0,579	33
86	0,750	1,789[a]	−0,490	−1,342	0,081	1,624	40
87	−0,824	−0,887	1,186	1,128	0,062	0,897	30
88	0,417	0,864	−0,045	−0,126	0,069	0,888	27
89	1,281	2,671[b]	−0,171	−0,558	0,194	4,320[a]	39

Table 5.34: **Selected annual stepwise regressions for Model AC201/2: September holding period, companies with significant beta and NO inflation adjustments**

Year	$\hat{\alpha}_1$[HC]	t-value	$\hat{\alpha}_2$[CC]	t-value	r^2	F-test	n
76	1,030	2,601[a]			0,080	6,765[a]	79
77			0,798	3,225[a]	0,131	10,398[a]	70
78			3,105	4,234[a]	0,264	17,928[a]	51
79	1,503	2,108[a]			0,113	4,442[a]	36
80	2,353	3,424[a]			0,236	11,725[a]	39
81			1,285	3,321[a]	0,245	11,029[a]	35
84			0,686	4,759[a]	0,393	22,646[a]	36
89	1,125	2,913[a]			0,187	8,487[a]	38

Table 5.35: Annual regressions for Model CRUDE/1: September holding period, companies with significant beta and NO inflation adjustments

Year	$\hat{\alpha}_1$[HC]	t-value	$\hat{\alpha}_2$[CC]	t-value	r^2	F-test	n
76	−2,699	−1,510	4,073	2,136[a]	0,131	5,818[a]	80
77	−2,877	−1,309	3,964	1,748[b]	0,157	6,352[a]	71
78	−5,270	−1,179	8,120	1,838[b]	0,239	7,684[a]	52
79	1,205	0,561	0,347	0,147	0,113	2,170	37
80	−2,924	−0,523	5,409	0,950	0,254	6,299[a]	40
81	−3,729	−1,522	5,005	2,005[b]	0,231	4,960[a]	36
82	−2,236	−1,036	1,746	0,807	0,121	1,787	29
83	0,615	0,168	−0,393	−0,098	0,056	0,832	31
84	4,991	2,008[b]	−4,479	−1,758[b]	0,323	8,107[a]	37
85	−0,028	−0,058	0,296	0,506	0,022	0,342	33
86	−2,642	−1,796[b]	4,061	2,100[a]	0,139	2,976[b]	40
87	−1,338	−1,242	2,074	1,453	0,089	1,324	30
88	−0,104	−0,132	0,407	0,640	0,084	1,099	27
89	1,014	1,137	0,127	0,138	0,187	4,140[a]	39

Table 5.36: Selected annual stepwise regressions for Model CRUDE/1: September holding period, companies with significant beta and NO inflation adjustments

Year	$\hat{\alpha}_1$[HC]	t-value	$\hat{\alpha}_2$[CC]	t-value	r^2	F-test	n
76			1,263	3,034[a]	0,106	9,207[a]	79
77			1,023	3,298[a]	0,136	10,879[a]	70
78			2,998	3,724[a]	0,217	13,870[a]	51
79	1,503	2,108[a]			0,113	4,442[a]	36
80			2,457	3,545[a]	0,248	12,565[a]	39
81			1,273	2,706[a]	0,177	7,321[a]	35
84	0,632	3,519[a]			0,261	12,382[a]	36
89	1,125	2,913[a]			0,187	8,487[a]	38

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CHAPTER SIX

THE INCOME MEASUREMENT PROPERTIES OF INFLATION-ADJUSTED INCOME

6.1 INTRODUCTION

In Chapter Five the incremental information content of the inflation-adjusted accounting income data which were generated using the models described in Chapter Three, was determined. It was found that the inflation-adjusted income contained little or no incremental information. The apparent lack on incremental information content could have been due to the following flaws in the research design. The explanatory variables used were collinear by design which often lead to an unexpected reversal in sign of their coefficients (Hanke, Reitsch & Dickson, 1984: 233). In addition this could have lead to a possible understatement of significance levels (Gujarati, 1978: 178). Beaver (1987: 142) showed that the use of market model residuals as the dependent variable of the regression is likely to understate the incremental explanatory power. Thus the lack of incremental information content found could have been due to the use of market model residuals. In addition Christie (1987) has advocated the design of a soundly specified econometric model which was lacking in the research design used in Chapter Five.

By applying the income measurement perspective used by Haw and Lustgarten (1988) most of the potential flaws of the research design used in Chapter Five can be addressed. In using the income measurement perspective they found that the components of the inflation adjustments conformed to expectations in terms of sign and statistical significance (Haw & Lustgarten, 1988). The income measurement perspective is, however, limited since it does not allow for inferences about the information content of the variables being tested. On the other hand the incremental information content approach used in Chapter Five is also limited in value since it was not constructed as an event study (which is impossible without actual disclosures). Thus, if the use of the income measurement perspective leads to a statistically significant relationship, this relation can be viewed as a necessary, but not sufficient, condition for the inflation adjustments to contain information useful to investors.

Since it was not possible to obtain significant results for the incremental information content of the estimated inflation-adjusted income, albeit due to a possibly flawed research design, it was deemed necessary to determine whether these adjustments contain income measurement properties. If some of the estimated inflation adjustments are found to contain significant income measurement properties, then at least a necessary condition for these adjustments to contain value will have been established.

In Section 6.2 the income measurement perspective is described in more detail. This is followed in Section 6.3 by a discussion of the research design used in this chapter, while the results of the analyses are presented in Section 6.4. A number of closing comments are made in Section 6.5.

6.2 THE INCOME MEASUREMENT PERSPECTIVE

The differences between the information content and income measurement approaches are discussed in Beaver and Demski (1979), Beaver, Griffin and Landsman (1982) and Haw and Lustgarten (1988). The principle of the income measurement approach hinges on the following. If markets existed for *all* the assets of a company, and the values of these assets were recorded without measurement error, the value of the company reported on the balance sheet under current cost accounting would equal the market value of the company's shares, because both values would reflect the expected present value of the future cash flows to be generated by the company's assets (Haw & Lustgarten, 1988: 332). Under these circumstances the Rand-value of the return on the company's shares (dividends and capital appreciation) will be equal to current cost net income plus the holding gain per share. In turn the current cost net income is equal to the historic cost net income minus the realised holding gains. Thus under perfect and complete markets,

$$R_t = NI^h_t - RHG_t + HG_t \qquad \text{...(6.1)}$$

where

R_t = return (dividends and capital apreciation) per share in year t;

NI^h_t = historic cost net income per share in year t;

RHG_t = realised holding gains per share in year t; and

HG_t = holding gains per share in year t.

The realised holding gains reflect the price changes from the time assets were acquired until they were expended, while the holding gains represent the gain on assets due to the price changes in the current period only, part of which is realised in the current period.

The left hand side of the equation indicates how investors perceive the change in the value of the assets between year $t-1$ and year t, whereas the right hand side of the equation indicates how accountants report the change in the company's value between year $t-1$ and year t under current cost accounting. Because the components on both sides are realisations, this equation holds under perfect and complete markets, regardless of investors' expectations.

Although an assumption is made regarding the markets, Equation 6.1 satisfies Christie's (1987) recommendation that the model to be investigated should contain a logical structure.

6.3 RESEARCH DESIGN

6.3.1 Sample selection

This investigation is limited to companies listed in the industrial section of the Johannesburg Stock Exchange (JSE). The period over which the investigation was performed, is identical to that used in Chapter Five and stretched from 1975 to 1989. This period includes both upward and downward phases of the economy (as reflected by the annual percentage change in Gross Domestic Product) and as such should be representative of the business cycle in the South African economy.

In addition, to control for the change in the inflation rate during a calendar year, only companies that have an accounting year-end of 30 June are included in the research. It was further decided to exclude the following companies in order to avoid possible confounding issues (a full motivation is provided in Chapter Five, Section 5.3.1):

* foreign companies;
* investment companies;
* pyramid holding companies;
* companies whose shares traded infrequently;
* companies that were moved to non-industrial sections of the JSE.

An additional requirement which was not used in Chapter Five is that all companies whose capital structure changed significantly during the year are also removed from the data set. The reason for this requirement is that the deflator used in this research is similar to that suggested by Christie (1987). He advocated the use of the opening market value of common equity as a deflator of the accounting variables. This may, however, not be the ideal value to use as deflator when the capital structure of the company has undergone a drastic change. For example if company A finances its takeover of company B by a rights issue, the consolidated results at the end of the year will reflect the sum of companies A and B, whereas the opening share capital does not reflect the additional investment needed from the shareholders to affect the takeover. Thus the data for companies in the years where capital structure changes were reported in the JSE Monthly Bulletin, were removed from the study. In addition it was found that for a number of companies the issued share capital increased from year to year. It is thought that small changes in the issued share capital will probably not affect the results of the current study to too large an extent. Wherever the issued share capital of a company, however, increased by more than 10 percent over a year, that particular company-year is excluded from the research. As a result 91 data points in total are removed over the total period of 14 years, leaving 1 165 data points for the analysis. (If only the data of companies whose issued share capital remained constant were to have been used, 352 data points would have been sacrificed.) This resulted in a sample which included a maximum of 117 companies in 1976, and a minimum of 55 companies in 1987. Data for 1975 is required in order to determine the inflation adjustments for 1976. Thus the first year for which the data is analysed, is 1976. A list of all the names of the companies included in this part of the research is included as Appendix F.

6.3.2 Inflation accounting models

The inflation accounting models used were described in detail in Chapter Three. For continuity and coherence a brief description of each one is provided here.

Two models are based on AC201 (SAICA, 1978) and differ with respect to the classification of monetary and non-monetary items. In Model AC201/1 all investments, loan levies and loans (asset) were considered to be monetary assets, while all preference shares, minority interest, convertible debentures and deferred taxation were considered to be non-monetary liabilities. This is the more pessimistic interpretation of AC201. The more realistic interpretation leads to Model AC201/2 in which all investments, loan levies and loans provided were classified as non-monetary assets. Convertible preference shares, minority interest, convertible debentures and deferred taxation were considered to be non-monetary liabilities.

In the CRUDE/1 model, the inflation adjustment of historic cost income is equal to the average of the opening and closing values of shareholders' funds multiplied by the increase in the consumer price index (CPI). In the CRUDE/2 model the equity adjustment used in the CRUDE/1 model is reduced by the estimated unrealised holding gain on fixed assets.

6.3.3 Share market data

In Chapter Four, Section 4.3.2 the share market data and the verification thereof was discussed. Using these data, annual share returns were calculated for each of the individual shares for each of the years 1975 to 1989 from 30 June of one year to 30 June of the next year. Since all shares do not necessarily trade every day, the actual return periods were from the last traded day closest to 30 June of each year to a similar date the next year. This is equivalent to using the prevailing trading price on 30 June, even if no actual trades took place on that particular day.

$$\mathbf{R}_{i,t} = \mathbf{P}_{i,t} - \mathbf{P}_{i,t-1} + \mathbf{D}_{i,t} \qquad \ldots(6.2)$$

where

$\mathbf{R}_{i,t}$	=	annual return on share i in year t;
$\mathbf{P}_{i,t}$	=	price of share i at the end of year t;
$\mathbf{P}_{i,t-1}$	=	price of share i at the start of year t; and
$\mathbf{D}_{i,t}$	=	dividends per share paid to shareholders of share i during year t.

6.3.4 The regression model

Equation 6.1 is the ideal model to be used in the analysis. Unfortunately neither AC201 nor the CRUDE models of inflation accounting described in Chapter Three make provision for the separate calculation of realised and unrealised holding gains. The two main adjustments calculated under AC201 are both realised holding gains. AC201 then requires a reduction of these adjustments (via the gearing adjustment) to determine what proportion of the realised holding gains is attributable to the ordinary shareholders. In Model CRUDE/2 the one part of the inflation adjustment can be seen as the holding gain on fixed assets, but in neither CRUDE model does the realised holding gains feature. If one assumes that the approach used in the various inflation accounting models is correct, the realised and unrealised holding gains in the equation above are replaced by a single inflation adjustment, which, if subtracted from the historic cost net income will yield the inflation-adjusted net income. Thus, under perfect and complete markets,

$$R_t = NI^h_t - IA_t \qquad \ldots(6.3)$$

where

IA_t = inflation adjustment to income per share in year t;

and all other variables as defined before.

Using *i* and *t* as company and year subscripts, this leads to the following equation to be estimated using multiple linear regression:

$$R_{i,t} = \alpha_{0,t} + \alpha_{1,t} NI^h_{i,t} + \alpha_{2,t} IA_{i,t} + u_{i,t} \qquad \ldots(6.4)$$

where

$\alpha_{j,t}$ = regression coefficients for year t, j = 0, 1 and 2;

$u_{i,t}$ = the stochastic error which for an ordinary least squares (OLS) regression is assumed to be independent, normally distributed with a mean of zero and a constant variance;

and all other variables as defined before.

From the Equation 6.4 one would expect that $\alpha_{0,t} = 0$, $\alpha_{1,t} = 1$ and $\alpha_{2,t} = -1$.

This form of the regression equation to be estimated was also used by Darnell and Skerratt (1989), although they used the unexpected part of the variables in their regression analysis. Compared with the regression equation estimated in Chapter Five where a historic cost income variable and an inflation-adjusted income variable lead to problems due to collinearity, the potential for collinearity between the variables is considerably reduced in the current design, since the inflation adjustment is primarily based on balance sheet quantities.

Since the variables are all measured in Rand-values, the assumption of homoscedasticity may not be valid (Gujarati, 1978: 201). The procedures followed to eliminate heteroscedasticity are discussed in Section 6.3.5.

6.3.5 Heteroscedasticity

In using ordinary least squares (OLS) regression, it is assumed that the error terms are independent, normally distributed with a mean of zero and a constant variance. Mathematically stated, it leads to the following (where $u_{i,t}$ is the error term in Equation 6.4)(Gujarati, 1978: 71):

$$E(u_{i,t}) = 0 \qquad \ldots(6.5)$$

$$E(u^2_{i,t}) = \sigma^2 \qquad \ldots(6.6)$$

$$E(u_{i,t}u_{j,t}) = 0, \; i \neq j \qquad \ldots(6.7)$$

or $u_{i,t} \sim N(0,\sigma^2)$

By the design of OLS Equation 6.5 is satisfied, whereas Equation 6.7 is satisfied if the error terms are independent (that is, no cross-sectional dependency exists). Equation 6.6 is the statement of homoscedasticity. If it is violated, the data contains heteroscedasticity, leading to significance tests which are less powerful with the resulting understatement of significance levels (Gujarati, 1978: 199). If an equation like Equation 6.4 where the variables are expressed in Rand-values is estimated, heteroscedasticity is likely to be present, as Gujarati (1978: 201) states: "... heteroscedasticity is generally expected if small-, medium-, and large-sized firms are sampled together". Heteroscedasticity does, however, not destroy the unbiasedness and consistency properties of the usual OLS estimators.

In previous studies, like most of the research reviewed in Chapter Two, it was assumed implicitly that by deflating the variables in Equation 6.4 by some quantity of the same order of magnitude, the problem of heteroscedasticity had been addressed. In Beaver, *et al.* (1982) R_t was calculated as a rate of return, which implied that the market value of equity at $t-1$, V_{t-1}, was the deflator. Bublitz, Frecka and McKeown (1985), Du Plessis, Archer and Affleck-Graves (1986) as well as the research presented in Chapter Five used a cumulative abnormal return as dependent variable, which implied that the average market value over 12 months was the deflator used. The independent variables were, however, treated differently. Beaver, ***et al.*** (1982) either used a year on year percentage change in the variables, or deflated the variables by the book value of shareholders' equity. Du Plessis, ***et al.*** (1986) and the research presented in Chapter Five also used the book value of shareholders' equity, whereas Bublitz, ***et al.*** (1985) used a combination of V_{t-1} and V_{t-2}. Christie (1987), however, recommended that the opening market value of ordinary shares should be used as a deflator.

If heteroscedasticity is expected, some form of remedial measure is required. Weighted least squares could be used, if the weights to be used are known. Alternatively all the variables could be scaled by some factor which would yield a homoscedastic error term. White (as reported in Haw and Lustgarten (1988: 339)) has also developed a procedure to calculate a heteroscedasticity-consistent variance estimate which can be used in the significance testing.

In this study the standard econometric procedure followed by Haw and Lustgarten (1988) to correct for the heteroscedasticity is used. If $E(u^2_{i,t})$ is known, weighted least squares (WLS) regression may be used to estimate the regression coefficients (Gujarati, 1978: 207). Although $E(u^2_{i,t})$ is not known explicitly, the recommendation of Christie (1987) is used in assuming that $E(u^2_{i,t})$ is related to V_{t-1}. Thus it assumed that:

$$\sqrt{E(u^2_{i,t})} = \gamma_0 + \gamma_1 V_{i,t-1} \qquad \ldots(6.8)$$

where

$V_{i,t-1}$ = market value of equity at the end of period $t-1$;

γ_j = regression coefficients, $j = 0$ and 1.

In previous studies which deflated the variables by $V_{i,t-1}$, it was implicitly assumed that $\gamma_0 = 0$ and $\gamma_1 = 1$. In order to estimate the correct deflator for the WLS regression, the residuals from the undeflated regression of Equation 6.4 are determined first. The absolute value of these residuals are then regressed on $V_{i,t-1}$ to determine γ_0 and γ_1. The estimating equation is thus:

$$|\hat{u}_{i,t}| = \gamma_0 + \gamma_1 V_{i,t-1} + \epsilon_{i,t} \qquad ...(6.9)$$

The predicted value from Equation 6.9 is:

$$|\hat{u}_{i,t}|^* = \hat{\gamma}_0 + \hat{\gamma}_1 V_{i,t-1} \qquad ...(6.10)$$

where $\hat{\gamma}_0$ and $\hat{\gamma}_1$ are the OLS estimates of Equation 6.9. $|\hat{u}_{j,t}|^*$ is then used to deflate all the variables in Equation 6.4 and the regression constant of that equation is replaced by the reciprocal of $|\hat{u}_{j,t}|^*$ as recommended by Gujarati (1978: 209). It is assumed that this treatment of the data is sufficient to ensure that possible heteroscedasticity has been accounted for, and no further tests for heteroscedasticity are performed.

6.3.5 Statistical analysis

In the regression analysis, the hypothesis testing concerns the significance of the coefficients of the explanatory variables. Haw and Lustgarten (1988) tested the null hypothesis which stated that the alpha coefficients were equal to nought, with the alternative hypothesis that the coefficients were not equal to nought. From the ***a priori*** model, however, the correct hypothesis test is to determine whether the coefficients are equal to their expected values as stated in Section 6.3.4. Stated symbolically:

$$H_0: \quad \alpha_{1,t} \quad = \quad 1$$
$$H_1: \quad \alpha_{1,t} \quad \neq \quad 1$$

and

$$H_0: \quad \alpha_{2,t} \quad = \quad -1$$
$$H_1: \quad \alpha_{2,t} \quad \neq \quad -1$$

These hypotheses are referred to as the stated hypotheses and are structured in such a way that the non-rejection of the null hypothesis is the desired outcome. Although such a test is open to larger Type II errors than a test in which the rejection of the null hypothesis is the desired outcome, the structure of the model is such that this form of hypothesis statement is the only feasible one. If either of the two null hypotheses is rejected one can, additionally, test the two null hypotheses which state that the separate alpha-coefficients are equal to nought. These hypotheses are referred to as the additional hypotheses. If either or both of these additional null hypotheses are rejected, and the sign of the regression coefficient conforms to expectations, the result can be interpreted as an indication, albeit weak, of the income measurement properties of the data.

In the analysis of variance of the overall multiple regression, the F-test indicates significance of the full regression. Stated symbolically:

$$H_0: \quad \alpha_{1,t} \quad = \quad \alpha_{2,t} \quad = \quad 0$$

H_1: At least one of $\alpha_{1,t}$ or $\alpha_{2,t}$ is not equal to zero

For the significance testing of the regression analyses that follow, no null or alternative hypotheses will be stated. For each analysis they conform to the statements above. The results pertaining to both the stated hypotheses above and the additional hypotheses (testing the equality of the regression coefficients to zero) are tabulated.

6.4 RESULTS

6.4.1 Introduction

The estimation of the weighting factor was performed in a Lotus 1-2-3 environment for each year and each model. The final transformed regression model was estimated using Statgraphics. The results for the analysis of the single years are discussed first for all four inflation accounting models and is presented in Section 6.4.2.

If the relationship established is not found to be very strong, one would expect to find a stronger relationship if years of data were to be combined. This was done for periods of two and three years (Haw and Lustgarten (1988) looked at all combinations up to 7 years). The Rand-values for the variables used in Equation 6.4 for each year were added, yielding on the left hand side of Equation 6.4 a two or three year return that the investor in the share would have received, and on the right hand side of the equation the two or three year inflation-adjusted income per share. After the values of the variables have been accumulated, the WLS regressions are repeated. The results for the extended periods are reported in Section 6.4.3.

Since the number of data points per year were not sufficient to perform any other subdivisions per year to possibly glean more information from the analysis, it was decided to pool all the data in a single cross-section over all the years and subdivide the pooled data into separate portfolios and repeat the regression analysis. The results for the pooled data are presented in Section 6.4.4.

For ease of reading and comparison the tables containing the regression results are presented at the end of the chapter. Tables 6.1 to 6.16 contain the results of the hypothesis tests of the stated hypotheses, while Tables 6.17 to 6.32 contain the results for the additional hypotheses (testing whether the separate α-coefficients are equal to nought).

6.4.2 Single year regressions

The regression results for Equation 6.4 are reported for each of the years in the sample period in Tables 6.1 to 6.4 for Models AC201/1, AC201/2, CRUDE/1 and CRUDE/2 and the stated hypotheses respectively. The comparable results for the additional hypotheses are presented in Tables 6.17 to 6.20.

The results in Tables 6.1 and 6.2 are very similar. The coefficient of NI^h does not differ significantly (at the 5% level) from its hypothesised value of +1 in 7 of the 14 years. It is significantly different from zero in all but one of the 14 years. It has the correct sign, but its value, however, varies considerably from a low of 0,163 for Model AC201/1 in 1977 to a high of 2,453 for Model AC201/2 in 1987. The inflation adjustment, IA, on the other hand has a coefficient that is significantly different from −1 in all but 1989. In all the other years it appears to be greater than −1. In addition its coefficient is significantly different from zero in only 5 of the 14 years for Model AC201/1 (once at the 10% level), and in 6 of the years for Model AC201/2 (twice at the 10% level). The sign of the coefficient is also not consistently negative. The r^2-values, which indicate the strength of the relationship, also vary from a low 0,156 to a high of 0,708. It is some consolation to see that the higher r^2-values are usually associated with negative coefficients for the inflation adjustment in conjunction with coefficients of NI^h that do not differ significantly from their hypothesised values of +1.

The results for the coefficient of NI^h in Tables 6.3 and 6.4 are similar to those in Tables 6.1 and 6.2, except that for Model CRUDE/1 the coefficient of NI^h is not significantly (at the 5% level) different from its hypothesised value of +1 in only 6 of the 14 years. The values of the coefficients of NI^h are also similar. The results for the coefficient of IA are a little better than those for the AC201 models. For Model CRUDE/1 the coefficient of IA not significantly different (at the 5% level) from its hypothesised value of −1 in 2 of the 14 years, while for Model CRUDE/2 this number improves to 6 out of the 14 years. Model CRUDE/1 displays an unexpected negative sign for the coefficient of NI^h in 1981 which seems to point to a problem of collinearity as was experienced in the analysis reported in Chapter Five. The coefficients of determination are similar to those in Tables

6.1 and 6.2. The maximum value increases to 0,729 for Model CRUDE/1 in 1980, and the minimum value decreases to 0,146 for Model CRUDE/2 in 1977.

In terms of the stated null hypothesis regarding the coefficient of the inflation adjustment, it seems as if Models CRUDE/2 displays the better income measurement properties. It should, however, be noted that the standard error of the coefficient sometimes displays such a large value that a positive coefficient is not found to be significantly different from -1. In terms of an overall fit of the model, Model CRUDE/2 displays coefficients for both explanatory variables that do not differ from their hypothesised values (at the 5% level of significance) in the three years 1987 to 1989. Thus, although limited, some indication of the appropriateness of the models is established.

Haw and Lustgarten (1988: 342), only reported whether the coefficients of the two explanatory variables differed significantly from zero. As such their results differ from those in this study. They found that the coefficients of the inflation adjustment components were usually statistically significant and of the correct sign. The remainder of the results are similar since they reported a range of values for $\hat{\alpha}_1$ of 0,39 to 2,61 while their r^2-values varied between 0,123 and 0,561. They did mention testing whether the coefficients of the explanatory variables were significantly different from their hypothesised values of $+1$ and -1, but details of the test were not supplied, except in most cases they had to reject the hypotheses.

The unexpected reversal in sign for the coefficient of the inflation adjustment in some of the years can possibly be due to the collinearity of the explanatory variables. In order to determine whether this is the case, the correlation between the explanatory variables is determined for those years where the inflation adjustment is positive and significantly different from zero. This does show some significant collinearity between NI^h and IA. For the AC201 models the r^2-values are low (a highest value of 0,084 is found), but for Model CRUDE/1 in 1981 the r^2-value is as high as 0,70. The collinearity between NI^h and the reciprocal of the WLS deflator, which replaced the constant in the regression, is also strong, with an r^2-value of as high as 0,48. Thus collinearity could possibly be a reason for the unexpected reversal in sign.

6.4.3 Multiple year regressions

The results for the two-year regressions are shown in Tables 6.5 to 6.8 and those for the three-year regressions in Tables 6.9 to 6.12 for Models AC201/1, AC201/2, CRUDE/1 and CRUDE/2 and the stated hypotheses respectively. The comparable results for the additional hypotheses are presented in Tables 6.21 to 6.24 for the two-year regressions and in Tables 6.25 to 6.28 for the three-year regressions.

The results in Tables 6.5 and 6.6 differ from those in Tables 6.1 and 6.2 for the AC201 models with respect to the inflation adjustment. The coefficient of NI^h does not differ significantly from its hypothesised value of +1 in more than half the periods analysed. In addition it is always positive and significantly different from zero at the 1% level. The coefficient of IA, does, however not improve. Its value is always significantly different from the hypothesised value of −1. Its sign is positive in 7 of the 13 periods, and it displays a negative sign combined with a value significantly different from zero in one period and then only at the 10% level for both models.

The CRUDE models display a similar behaviour for the two-year regressions. Like for the AC201 models, the coefficient of NI^h does not differ significantly (at the 5% level) from its hypothesised value of +1 in more than half the periods analysed. The coefficient of IA displays results that are only marginally better than those found for the AC201 models. For Model CRUDE/1 the coefficient of IA does not differ significantly from its hypothesised value of −1 in only one year, while for Model CRUDE/2 this occurs in three years. In the periods 1987-1988 and 1988-1989 Model CRUDE/2 displays coefficients for both explanatory variables that do not differ significantly from their respective hypothesised values. This seems to indicate that Model CRUDE/2 contains the better income measurement properties of the inflation accounting models investigated.

For all models the r^2-values improve slightly, with a maximum of 0,785 being recorded in the 79-80 year combination for Model CRUDE/1. This is similar to what Haw and Lustgarten (1988) found.

Results for the three-year combinations are very similar to those for the two-year combinations. For both AC201 models the coefficient of NI^h does not differ significantly from its hypothesised value of +1 in 7 of the 12 periods. The CRUDE models improve on this number with 8 periods out of 12 for Model CRUDE/1 and 9 periods out of 12 for Model CRUDE/2. The aggregation of the raw data into three-year measures does, however, not seem to improve significance of the coefficient of IA. It is significantly different from its hypothesised value of −1 in all the periods for both the AC201 models as well as the CRUDE/1 model. Only Model CRUDE/2 displays 2 periods in which this coefficient does not differ significantly from its hypothesised value. The coefficient of IA frequently displays a positive sign. For these instances they were also tested to determine whether they differed significantly form zero. For the AC201 models this hypothesis is never rejected, but for the CRUDE models the coefficients are significantly different from zero in a positive direction in each of four periods. The r^2-values for the three-year combinations improve a little for all the models.

Unfortunately the available data is somewhat too limited to allow further detailed experimentation in an attempt to try and resolve the significant deviation from −1 of the coefficient of the inflation adjustment. (Haw and Lustgarten (1988) had a minimum of 381 companies in a single year, and a maximum of 576.) The limited number of South African companies do not allow the splitting of the samples into sub-samples on an annual basis. Some information may possibly be gleaned from pooling the data over a number of years.

6.4.4 Pooled regressions

To see if the business cycle has an influence on the results, the data from years with a positive growth in the real Gross Domestic Product (GDP) are pooled together as well as those from years with a negative or zero growth in the real GDP. A slight variation is obtained by grouping data from years with an increasing growth rate in the real GDP and those with a decreasing growth rate in the real GDP. The GDP over the period is shown in Figure 1.2 in Chapter One and was extracted from the Quarterly Bulletin of the South

African Reserve Bank.

An alternative way of grouping the data is accomplished by pooling the data from companies that seemed to have made some attempt to account for the effect of inflation by either publishing supplementary inflation-adjusted income data, or by using some form of the last-in-first-out (LIFO) method of inventory valuation, or by accounting for additional depreciation in the income statement. Data from companies that did not make any effort to account for the effects of inflation are pooled in a second sample.

A final grouping is achieved by pooling the data from companies that are no longer listed as industrial companies. The last three years' data prior to delisting or change in sector are pooled. The rationale for this grouping is that these companies could be seen as failed (a change from the industrial section to another section usually follows a takeover, and companies that have been the target of a takeover may well be seen as having failed). One reason for failing could be the neglect in accounting for the effects of inflation. For these companies one could thus expect higher inflation adjustments and the possibility of a stronger association with the share returns.

The results of the regressions for the various pooled groupings of the data are given in Tables 6.13 to 6.16 for the Models AC201/1, AC201/2, CRUDE/1 and CRUDE/2 and the stated hypotheses respectively. The comparable results for the additional hypotheses are presented in Tables 6.29 to 6.32.

The results of the pooling of the data are disappointing. The coefficient of NI^h is significantly (at the 5% level) different from its hypothesised value of +1 in 5 out of 8 different cases of pooling for Model CRUDE/1, for 3 out of the 8 cases for Model CRUDE/2, but never so for the two AC201 models. The coefficient of the inflation adjustment, however, remains positive, is small in value and is significantly different from its hypothesised value of −1 in all cases of pooling, over all models except for Model CRUDE/2 and companies with some disclosed inflation adjustments. A small consolation is that at least for all the other models and companies that have made some form of inflation adjustment, the coefficient of IA is not significantly different from zero.

Haw and Lustgarten (1988) split their sample on positive and negative net income companies and found that for the negative net income companies the coefficients of the realised holding gains and the holding gains were largely insignificant and often with unexpected signs. Although Haw and Lustgarten (1988) performed different significance tests on their coefficients, it appears as if the results of this study are similar to their findings for negative net income companies.

The similarity between the results for the two different interpretations of AC201 is also marked. The similarity of the coefficient of NI^h is expected, since the same historic income is involved, but the similarity of the coefficient of IA is unexpected. In Chapter Three it was established that the two interpretations of AC201 yielded significantly different inflation adjustments. One would thus have expected a greater difference in the values of the coefficient of IA for the two models based on different classifications of monetary assets and liabilities.

The results can be summarised with the comment regarding each of the two explanatory variables. The historic cost income variable displays income measurement properties according to the hypothesised model in about half of all the regressions for all inflation accounting models. The inflation adjustments generated by Model CRUDE/2, however, seem to be the only adjustments to contain some income measurement properties. The negative coefficients for variable IA that are obtained for the pooled regressions for companies that disclosed some form of inflation adjustment and whose adjustments were modelled according to the AC201 models, probably indicates that a closer investigation of those companies could be warranted.

6.5 CONCLUSIONS

In this chapter an income measurement perspective was used to evaluate the relationship between share returns, historic cost income per share and an inflation adjustment per share estimated according to the four inflation accounting models described in Chapter Two. For the historic cost income the results confirm prior expectations in terms of the sign and size for about 50 percent of all regressions estimated. Except for the CRUDE/2 model, the inflation adjustment do, however, not seem to have any influence on the share return.

A number of reasons could be forwarded in an attempt to try and explain why the inflation adjustments do not seem to have much value. The first is quite clearly the fact that the research was based on estimated adjustments and not disclosed adjustments. Although Bernard and Ruland (1987) found that they could estimate inflation adjustments for companies listed on the New York Stock Exchange with a high degree of accuracy, it does not necessarily mean that all attempts at estimating inflation adjustments will be successful.

A second reason could be that all assets and liabilities of the companies have not been recorded without error, yielding biases in the estimated inflation adjustments as well as the regression coefficients of the income measurement model. In addition the income measurement perspective assumes the existence of markets for all of the companies' assets which is clearly not the case.

The adjustments included in the various models could also be insufficient. The additional depreciation and cost of sales adjustments are typical realised holding gains, but no attempt is made in AC201 to estimate the holding gains of the company. In addition the realised holding gains attributable to the ordinary shareholder is seen to be a reduced amount (reduced by the gearing adjustment). The economic necessity for such a gearing adjustment is not that clear, and this could lead to a misspecification in Equation 6.4. On the other hand Model CRUDE/2 contains a holding gains adjustment on fixed assets, but it does not contain adjustments for the realised holding gains. Perhaps the estimated holding gains made this model superior to the other models. Model CRUDE/1 contains neither holding gains nor realised holding gains in its adjustment.

The fact that various sub-groupings of the data could not help in identifying significance of the inflation adjustments under different interpretations of AC201, does put a question mark over its validity. If it had been possible to establish that the AC201 data was useful in an income measurement context, this on its own would still not have been a sufficient condition for AC201 data to be useful to investors. Since no relationship could be established, it can be stated that the estimated AC201 data do not seem to be useful to investors.

The literature that was briefly reviewed in Chapter Three suggested that inflation accounting models like the CRUDE models could be the type of simple inflation adjustment that companies should disclose to account for the effect of inflation. Since the estimated adjustments according to Model CRUDE/1 do not seem to have income measurement properties, this model, too, does not seem to be useful to investors. The limited success that was achieved using Model CRUDE/2 could point to a need to incorporate some form of reporting about holding gains. Simple adjustments for inflation could, however, still be useful if they contained sufficient company specific information that cannot be captured by the crude estimates made in Chapter Three.

Table 6.1: Regression results for individual years for Model AC201/1: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,417	−6,149[a]	0,024	11,468[a]	0,178	8,207[a]	117
77	0,163	−8,633[a]	0,132	24,042[a]	0,157	6,860[a]	113
78	0,790	1,744[b]	−0,127	15,870[a]	0,543	41,252[a]	107
79	1,182	1,654	−0,022	57,126[a]	0,708	76,776[a]	98
80	1,308	1,892[b]	−0,040	16,271[a]	0,707	71,487[a]	92
81	1,110	0,494	−0,126	7,882[a]	0,419	17,547[a]	76
82	0,440	−5,091[a]	0,048	20,556[a]	0,221	7,090[a]	78
83	2,241	4,621[a]	−0,224	6,380[a]	0,644	46,509[a]	80
84	0,835	−0,677	0,379	8,486[a]	0,445	17,080[a]	67
85	0,984	−0,086	−0,025	17,473[a]	0,335	11,410[a]	71
86	0,929	−0,342	0,075	20,360[a]	0,363	11,213[a]	62
87	2,438	2,505[a]	0,234	7,713[a]	0,531	19,637[a]	55
88	0,242	−2,331[a]	0,484	6,342[a]	0,202	5,216[a]	65
89	1,947	3,118[a]	−0,520	1,321	0,452	22,307[a]	84

The following key holds for all tables:

[a] Denotes significance at the 5% level

[b] Denotes significance at the 10% level

n Denotes the number of observations

Table 6.2: **Regression results for individual years for Model AC201/2: stated hypotheses**

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,418	−6,150[a]	0,022	11,110[a]	0,178	8,202[a]	117
77	0,165	−8,608[a]	0,137	22,998[a]	0,156	6,782[a]	113
78	0,787	−1,779[b]	−0,132	15,400[a]	0,544	41,334[a]	107
79	1,180	1,635	−0,022	55,585[a]	0,707	76,591[a]	98
80	1,310	1,612	−0,044	15,940[a]	0,707	71,434[a]	92
81	1,111	0,501	−0,129	7,856[a]	0,420	17,619[a]	76
82	0,440	−5,138[a]	0,053	20,447[a]	0,223	7,180[a]	78
83	2,234	4,634[a]	−0,233	6,147[a]	0,645	46,597[a]	80
84	0,872	−0,528	0,373	8,006[a]	0,443	16,964[a]	67
85	1,163	0,824	−0,046	15,344[a]	0,358	12,663[a]	71
86	0,935	−0,314	0,074	17,280[a]	0,361	11,099[a]	62
87	2,453	2,549[a]	0,248	7,691[a]	0,533	19,775[a]	55
88	0,291	−2,249[a]	0,539	6,035[a]	0,201	5,199[a]	65
89	1,942	3,348[a]	−0,645	0,923	0,456	22,678[a]	84

Table 6.3: Regression results for individual years for Model CRUDE/1: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,416	−4,444[a]	0,024	4,990[a]	0,177	8,180[a]	117
77	0,601	−3,311[a]	−0,731	1,517	0,221	10,375[a]	113
78	0,716	−1,668	−0,089	3,158[a]	0,519	37,426[a]	107
79	1,044	0,327	0,222	8,984[a]	0,715	79,343[a]	98
80	1,789	2,880[a]	−0,858	0,422	0,729	79,835[a]	92
81	−0,565	−5,148[a]	3,474	8,018[a]	0,629	41,264[a]	76
82	0,441	−3,993[a]	0,056	4,853[a]	0,210	6,660[a]	78
83	1,825	2,260[a]	0,436	2,730[a]	0,631	43,950[a]	80
84	0,599	−1,332	1,094	5,070[a]	0,470	18,893[a]	67
85	0,535	−2,672[a]	0,200	9,597[a]	0,613	35,939[a]	71
86	0,962	−0,149	0,183	4,573[a]	0,369	11,493[a]	62
87	1,313	0,445	2,406	5,216[a]	0,620	28,289[a]	55
88	0,186	−1,777[b]	0,758	2,540[a]	0,164	4,055[a]	65
89	1,680	2,159[a]	0,009	2,801[a]	0,446	21,726[a]	84

Table 6.4: Regression results for individual years for Model CRUDE/2: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,508	−4,529[a]	−0,323	2,584[a]	0,182	8,447[a]	117
77	0,399	−5,509[a]	−0,613	1,565	0,146	6,224[a]	113
78	0,670	−2,166[a]	−0,097	2,715[a]	0,518	37,277[a]	107
79	1,143	1,042	0,247	5,538[a]	0,718	80,739[a]	98
80	1,343	1,593	−0,227	1,860[b]	0,704	70,490[a]	92
81	0,259	−2,808[a]	2,670	4,984[a]	0,513	25,600[a]	76
82	0,425	−4,353[a]	0,173	3,727[a]	0,216	6,880[a]	78
83	2,004	3,198[a]	0,145	1,751[b]	0,628	43,387[a]	80
84	0,950	−0,172	0,983	3,246[a]	0,454	17,714[a]	67
85	0,490	−3,022[a]	0,311	5,444[a]	0,301	9,745[a]	71
86	0,910	−0,387	0,500	3,233[a]	0,362	11,179[a]	62
87	2,450	1,946[b]	1,332	1,384	0,526	19,240[a]	55
88	0,444	−1,514	0,609	1,585	0,152	3,712[a]	65
89	1,545	1,828[b]	0,216	1,900[b]	0,434	20,668[a]	84

Table 6.5: Regression results for two years combined for Model AC201/1: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,176	−12,121[a]	0,092	24,943[a]	0,174	7,381[a]	108
77-78	0,489	−6,070[a]	−0,004	29,281[a]	0,398	22,236[a]	104
78-79	0,887	−0,975	−0,004	29,289[a]	0,665	61,420[a]	96
79-80	1,251	1,761[b]	−0,036	25,574[a]	0,783	98,541[a]	85
80-81	1,216	1,150	−0,130	12,691[a]	0,678	45,013[a]	67
81-82	0,760	−2,055[a]	0,003	18,771[a]	0,557	25,167[a]	63
82-83	1,279	1,559	−0,095	11,556[a]	0,564	29,277[a]	71
83-84	1,932	3,504[a]	−0,037	6,736[a]	0,688	43,430[a]	62
84-85	0,661	−3,745[a]	0,144	21,644[a]	0,519	21,599[a]	63
85-86	0,995	−0,024	0,029	24,502[a]	0,419	12,764[a]	56
86-87	1,622	2,015[a]	0,124	14,432[a]	0,664	30,309[a]	49
87-88	1,114	0,387	0,147	7,440[a]	0,564	16,818[a]	42
88-89	0,910	−0,363	0,327	5,036[a]	0,347	8,688[a]	52

Table 6.6: Regression results for two years combined for Model AC201/2: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,177	−12,093[a]	0,093	24,075[a]	0,172	7,273[a]	108
77-78	0,490	−6,090[a]	−0,005	28,415[a]	0,398	22,244[a]	104
78-79	0,889	−0,967	−0,006	28,522[a]	0,665	61,497[a]	96
79-80	1,253	1,779[b]	−0,038	25,183[a]	0,783	98,624[a]	85
80-81	1,215	1,152	−0,132	12,616[a]	0,679	45,114[a]	67
81-82	0,760	−2,071[a]	0,003	18,713[a]	0,557	25,160[a]	63
82-83	1,272	1,528	−0,092	11,464[a]	0,563	29,188[a]	71
83-84	1,934	3,565[a]	−0,043	6,564[a]	0,688	43,439[a]	62
84-85	0,796	−1,365	0,114	15,260[a]	0,377	12,093[a]	63
85-86	0,999	−0,007	0,030	24,115[a]	0,420	12,772[a]	56
86-87	1,632	2,065[a]	0,132	14,329[a]	0,666	30,597[a]	49
87-88	1,118	0,408	0,169	7,238[a]	0,566	16,924[a]	42
88-89	1,003	0,012	0,314	4,277[a]	0,358	9,096[a]	52

Table 6.7: Regression results for two years combined for Model CRUDE/1: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,379	−6,351[a]	−0,276	5,109[a]	0,165	6,899[a]	108
77-78	0,816	−1,758[b]	−0,631	2,365[a]	0,498	33,369[a]	104
78-79	0,794	−1,348	0,182	6,199[a]	0,674	64,232[a]	96
79-80	1,388	1,962[a]	0,288	3,200[a]	0,785	99,987[a]	85
80-81	0,338	−2,365[a]	1,392	5,537[a]	0,717	54,171[a]	67
81-82	0,272	−4,676[a]	1,024	8,006[a]	0,664	39,576[a]	63
82-83	1,186	0,705	0,011	2,567[a]	0,555	28,278[a]	71
83-84	1,417	1,192	0,775	3,807[a]	0,705	46,978[a]	62
84-85	0,529	−4,777[a]	0,453	13,698[a]	0,765	65,088[a]	63
85-86	1,237	1,039	−0,138	4,277[a]	0,484	16,569[a]	56
86-87	1,393	1,102	0,920	6,063[a]	0,718	39,002[a]	49
87-88	0,969	−0,068	0,388	2,342[a]	0,543	15,450[a]	42
88-89	1,129	0,395	−0,281	1,587	0,305	7,178[a]	52

Table 6.8: Regression results for two years combined for Model CRUDE/2: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,336	−8,539[a]	−0,351	3,933[a]	0,174	7,349[a]	108
77-78	0,629	−4,145[a]	−0,540	2,308[a]	0,445	27,013[a]	104
78-79	0,980	−0,165	−0,032	4,089[a]	0,730	83,854[a]	96
79-80	1,223	1,370	0,023	3,467[a]	0,778	95,837[a]	85
80-81	0,931	−0,311	0,505	3,184[a]	0,665	42,408[a]	67
81-82	0,398	−4,954[a]	1,236	8,470[a]	0,685	43,424[a]	63
82-83	1,209	0,965	−0,052	2,121[a]	0,555	28,214[a]	71
83-84	1,621	2,275[a]	0,877	3,330[a]	0,703	46,608[a]	62
84-85	0,518	−8,528[a]	0,750	8,578[a]	0,797	78,656[a]	63
85-86	1,003	0,015	0,180	3,480[a]	0,434	13,528[a]	56
86-87	1,862	2,358[a]	0,235	1,925[b]	0,661	29,901[a]	49
87-88	1,226	0,666	−0,058	1,207	0,548	15,761[a]	42
88-89	0,777	−0,778	0,118	1,481	0,245	5,289[a]	52

Table 6.9: Regression results for three years combined of Model AC201/1: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,278	−11,993[a]	0,028	−32,739[a]	0,356	17,906[a]	100
77-79	0,779	−3,061[a]	0,007	48,312[a]	0,740	85,418[a]	93
78-80	1,213	1,729[b]	−0,065	24,336[a]	0,813	114,416[a]	82
79-81	1,196	1,249	−0,116	17,052[a]	0,752	59,682[a]	62
80-82	0,780	−2,100[a]	−0,030	23,281[a]	0,756	53,840[a]	55
81-83	1,088	0,502	−0,052	11,947[a]	0,603	27,827[a]	58
82-84	1,379	1,642	−0,055	8,457[a]	0,607	26,720[a]	55
83-85	1,572	2,827[a]	0,144	11,407[a]	0,691	41,773[a]	59
84-86	1,093	0,601	0,020	19,205[a]	0,608	24,329[a]	50
85-87	1,467	2,084[a]	0,046	16,680[a]	0,703	33,128[a]	45
86-88	1,396	1,578	0,055	9,868[a]	0,683	25,111[a]	38
87-89	1,266	0,832	0,287	5,255[a]	0,650	19,155[a]	34

Table 6.10: Regression results for three years combined for Model AC201/2: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,277	−12,099[a]	0,029	32,156[a]	0,356	17,842[a]	100
77-79	0,779	−3,081[a]	0,008	46,657[a]	0,740	85,429[a]	93
78-80	1,212	1,733[b]	−0,069	23,879[a]	0,813	114,726[a]	82
79-81	1,199	1,275	−0,119	16,942[a]	0,753	59,921[a]	62
80-82	0,780	−2,115[a]	−0,031	23,228[a]	0,757	53,890[a]	55
81-83	1,087	0,498[a]	−0,053	11,897[a]	0,603	27,804[a]	58
82-84	1,375	1,643	−0,053	8,455[a]	0,606	26,689[a]	55
83-85	1,691	3,313[a]	0,081	9,740[a]	0,685	40,584[a]	59
84-86	1,103	0,673	0,017	18,660[a]	0,611	24,585[a]	50
85-87	1,469	2,113[a]	0,053	16,448[a]	0,705	33,381[a]	45
86-88	1,394	1,591	0,068	9,592[a]	0,684	25,238[a]	38
87-89	1,257	0,840	0,347	5,284[a]	0,655	19,581[a]	34

Table 6.11: Regression results for three years combined for Model CRUDE/1: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,478	−5,932[a]	−0,296	5,498[a]	0,396	21,206[a]	100
77-79	0,925	−0,809	−0,242	6,358[a]	0,751	90,461[a]	93
78-80	1,353	1,930[b]	−0,335	3,023[a]	0,811	113,002[a]	82
79-81	0,417	2,617[a]	1,077	6,108[a]	0,775	67,614[a]	62
80-82	0,280	−5,455[a]	0,932	9,471[a]	0,823	80,780[a]	55
81-83	0,437	−2,127[a]	1,082	5,395[a]	0,644	33,184[a]	58
82-84	0,933	−0,194	0,731	3,637[a]	0,620	28,243[a]	55
83-85	1,177	0,795	0,601	8,127[a]	0,720	48,073[a]	59
84-86	1,187	0,956	0,055	5,599[a]	0,675	32,542[a]	50
85-87	1,427	1,620	0,333	5,563[a]	0,732	38,382[a]	45
86-88	1,093	0,256	0,505	3,671[a]	0,691	26,088[a]	38
87-89	1,452	1,171	0,086	6,492[a]	0,635	17,944[a]	34

Table 6.12: Regression results for three years combined for Model CRUDE/2: stated hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,416	−8,346[a]	−0,339	4,543[a]	0,391	20,771[a]	100
77-79	0,887	−1,437	−0,373	3,710[a]	0,759	94,269[a]	93
78-80	1,145	1,019	−0,003	3,728[a]	0,804	107,785[a]	82
79-81	0,892	−0,590	0,495	3,874[a]	0,737	55,017[a]	62
80-82	0,519	−4,072	0,744	7,061[a]	0,790	65,323[a]	55
81-83	0,694	−1,523	1,063	5,045[a]	0,643	33,089[a]	58
82-84	1,096	0,376	0,885	2,091[a]	0,623	28,675[a]	55
83-85	1,314	1,630	0,744	6,346[a]	0,709	45,525[a]	59
84-86	1,081	0,467	0,098	3,269[a]	0,605	24,028[a]	50
85-87	1,625	2,454[a]	−0,031	2,145[a]	0,716	35,215[a]	45
86-88	1,408	1,480	0,059	1,912[b]	0,672	23,859[a]	38
87-89	1,424	1,164	0,268	1,401	0,635	18,000[a]	34

Table 6.13: Pooled regression results of annual data for Model AC201/1: stated hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	1,005	0,077	0,096	41,769[a]	0,363	155,464[a]	823
Negative GDP growth	0,861	−1,491	0,037	26,875[a]	0,239	35,570[a]	342
Increasing GDP growth	1,059	0,632	0,092	36,760[a]	0,409	125,459[a]	546
Declining GDP growth	0,922	−1,097	0,016	30,385[a]	0,265	74,022[a]	619
With adjustment	1,324	1,985[b]	0,137	8,316[a]	0,488	47,748[a]	153
Without adjustment	0,936	1,033	0,077	53,181[a]	0,317	156,095[a]	1012
Delisted	1,237	1,679[b]	0,129	14,385[a]	0,398	40,912[a]	189
All	0,990	−0,170	0,078	49,015[a]	0,329	189,495[a]	1165

Table 6.14: Pooled regression results of annual data for Model AC201/2: stated hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	1,012	0,164	0,095	40,948[a]	0,362	155,081[a]	823
Negative GDP growth	0,882	−1,249	0,028	25,286[a]	0,241	35,901[a]	342
Increasing GDP growth	1,064	0,692	0,093	36,162[a]	0,409	125,359[a]	546
Declining GDP growth	0,935	−0,927	0,008	29,148[a]	0,266	74,487[a]	619
With adjustment	1,306	1,879[b]	0,187	8,050[a]	0,491	48,151[a]	153
Without adjustment	0,943	−0,910	0,076	51,724[a]	0,316	155,264[a]	1012
Delisted	1,296	2,044[a]	0,105	13,255[a]	0,394	40,267[a]	189
All	0,996	−0,061	0,077	47,770[a]	0,328	189,034[a]	1165

Table 6.15: Pooled regression results of annual data for Model CRUDE/1: stated hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	0,731	−2,991[a]	0,785	15,388[a]	0,385	171,261[a]	823
Negative GDP growth	0,793	−1,931[b]	0,187	9,637[a]	0,242	36,092[a]	342
Increasing GDP growth	0,835	−1,478	0,698	12,403[a]	0,422	132,295[a]	546
Declining GDP growth	0,801	−2,381[a]	0,261	11,784[a]	0,270	76,037[a]	619
With adjustment	1,415	2,203[a]	−0,080	3,759[a]	0,483	46,649[a]	153
Without adjustment	0,731	−3,665[a]	0,604	16,234[a]	0,331	167,001[a]	1012
Delisted	1,057	0,380	0,441	4,060[a]	0,421	45,049[a]	189
All	0,813	−2,688[a]	0,504	17,350[a]	0,341	199,987[a]	1165

Table 6.16: Pooled regression results of annual data for Model CRUDE/2: stated hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	0,904	−1,123	0,723	9,423[a]	0,364	156,266[a]	823
Negative GDP growth	0,768	−2,231[a]	0,390	6,857[a]	0,243	36,365[a]	342
Increasing GDP growth	1,045	0,406	0,593	7,018[a]	0,399	120,243[a]	546
Declining GDP growth	0,766	−2,873[a]	0,540	9,167[a]	0,274	77,377[a]	619
With adjustment	1,460	2,369[a]	−0,297	1,543	0,484	46,922[a]	153
Without adjustment	0,864	−1,917[b]	0,506	10,390[a]	0,316	155,148[a]	1012
Delisted	1,098	0,624	0,495	6,411[a]	0,403	41,920[a]	189
All	0,905	−1,415	0,541	11,086[a]	0,330	190,714[a]	1165

Table 6.17: Regression results for individual years for model AC201/1 additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,417	4,400[a]	0,024	0,270	0,178	8,207[a]	117
77	0,163	1,674[b]	0,132	2,811[a]	0,157	6,860[a]	113
78	0,790	6,551[a]	−0,127	−2,315[a]	0,543	41,252[a]	107
79	1,182	10,735[a]	−0,022	−1,302	0,708	76,776[a]	98
80	1,308	6,789[a]	−0,040	−0,673	0,707	71,487[a]	92
81	1,110	4,981[a]	−0,126	−1,133	0,419	17,547[a]	76
82	0,440	4,000[a]	0,048	0,944	0,221	7,090[a]	78
83	2,241	8,344[a]	−0,224	−1,837[b]	0,644	46,509[a]	80
84	0,835	3,424[a]	0,379	2,333[a]	0,445	17,080[a]	67
85	0,984	5,261[a]	−0,025	−0,446	0,335	11,410[a]	71
86	0,929	4,459[a]	0,075	1,413	0,363	11,213[a]	62
87	2,438	4,247[a]	0,234	1,460	0,531	19,637[a]	55
88	0,242	0,746	0,484	2,069[a]	0,202	5,216[a]	65
89	1,947	6,409[a]	−0,520	−1,431	0,452	22,307[a]	84

Table 6.18: Regression results for individual years for model AC201/2: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,418	4,424[a]	0,022	0,240	0,178	8,202[a]	117
77	0,165	1,702[b]	0,137	2,776[a]	0,156	6,782[a]	113
78	0,787	6,568[a]	−0,132	−2,340[a]	0,544	41,334[a]	107
79	1,180	10,718[a]	−0,022	−1,235	0,707	76,591[a]	98
80	1,310	6,819[a]	−0,044	−0,725	0,707	71,434[a]	92
81	1,111	5,009[a]	−0,129	−1,154	0,420	17,619[a]	76
82	0,440	4,030[a]	0,053	1,029	0,223	7,180[a]	78
83	2,234	8,387[a]	−0,233	−1,866[b]	0,645	46,597[a]	80
84	0,872	3,550[a]	0,373	2,174[a]	0,443	16,964[a]	67
85	1,163	5,870[a]	−0,046	−0,733	0,358	12,663[a]	71
86	0,935	4,522[a]	0,074	1,372	0,361	11,099[a]	62
87	2,453	4,304[a]	0,248	1,529	0,533	19,775[a]	55
88	0,291	0,924	0,539	2,112[a]	0,201	5,199[a]	65
89	1,942	6,903[a]	−0,645	−1,680[b]	0,456	22,678[a]	84

Table 6.19: Regression results for individual years for model CRUDE/1: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,416	3,168[a]	0,024	0,114	0,177	8,180[a]	117
77	0,601	4,990[a]	−0,731	−4,124[a]	0,221	10,375[a]	113
78	0,716	4,216[a]	−0,089	−0,307[a]	0,519	37,426[a]	107
79	1,044	7,672[a]	0,222	1,632	0,715	79,343[a]	98
80	1,789	6,526[a]	−0,858	−2,542[a]	0,729	79,835[a]	92
81	−0,565	−1,859[b]	3,474	6,226[a]	0,629	41,264[a]	76
82	0,441	3,150[a]	0,056	0,258	0,210	6,660[a]	78
83	1,825	5,003[a]	0,436	0,829	0,631	43,950[a]	80
84	0,599	1,989[b]	1,094	2,648[a]	0,470	18,893[a]	67
85	0,535	3,076[a]	0,200	1,600	0,613	35,939[a]	71
86	0,962	3,725[a]	0,183	0,706	0,369	11,493[a]	62
87	1,313	1,865[b]	2,406	3,684[a]	0,620	28,289[a]	55
88	0,186	0,405	0,758	1,095	0,164	4,055[a]	65
89	1,680	5,330[a]	0,009	0,024	0,446	21,726[a]	84

Table 6.20: Regression results for individual years for model CRUDE/2: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76	0,508	4,670^a	−0,323	−1,233	0,182	8,447^a	117
77	0,399	3,662^a	−0,613	−2,484^a	0,146	6,224^a	113
78	0,670	5,053^a	−0,097	−0,292	0,518	37,277^a	107
79	1,143	8,324^a	0,247	1,096	0,718	80,739^a	98
80	1,343	6,243^a	−0,227	−0,545	0,704	70,490^a	92
81	0,259	0,984	2,670	3,982^a	0,513	25,600^a	76
82	0,425	3,214^a	0,173	0,569	0,216	6,880^a	78
83	2,004	6,385^a	0,145	0,222	0,628	43,387^a	80
84	0,950	3,266^a	0,983	1,610	0,454	17,714^a	67
85	0,490	2,899^a	0,311	1,291	0,301	9,745^a	71
86	0,910	3,917^a	0,500	1,079	0,362	11,179^a	62
87	2,450	3,287^a	1,332	0,962	0,526	19,240^a	55
88	0,444	1,207	0,609	0,600	0,152	3,712^a	65
89	1,545	5,180^a	0,216	0,337	0,434	20,668^a	84

Table 6.21: Regression results for two years combined for model AC201/1: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,176	2,584[a]	0,092	2,111[a]	0,174	7,381[a]	108
77-78	0,489	5,806[a]	−0,004	−0,130	0,398	22,236[a]	104
78-79	0,887	7,681[a]	−0,004	−0,123	0,665	61,420[a]	96
79−80	1,251	8,781[a]	−0,036	−0,951	0,783	98,541[a]	85
80−81	1,216	6,480[a]	−0,130	−1,882[b]	0,678	45,013[a]	67
81−82	0,760	6,513[a]	0,003	0,062	0,557	25,167[a]	63
82-83	1,279	7,147[a]	−0,095	−1,208	0,564	29,277[a]	71
83-84	1,932	7,264[a]	−0,037	−0,261	0,688	43,430[a]	62
84-85	0,661	7,308[a]	0,144	2,719[a]	0,519	21,599[a]	63
85-86	0,995	5,655[a]	0,029	0,693	0,419	12,764[a]	56
86-87	1,622	5,254[a]	0,124	1,590	0,664	30,309[a]	49
87-88	1,114	3,784[a]	0,147	0,955	0,564	16,818[a]	42
88-89	0,910	3,660[a]	0,327	1,240	0,347	8,688[a]	52

Table 6.22: Regression results for two years combined for model AC201/2: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,177	2,614[a]	0,093	2,051[a]	0,172	7,273[a]	108
77-78	0,490	5,843[a]	−0,005	−0,156	0,398	22,244[a]	104
78-79	0,889	7,718[a]	−0,006	−0,178	0,665	61,497[a]	96
79-80	1,253	8,823[a]	−0,038	−0,994	0,783	98,624[a]	85
80-81	1,215	6,511[a]	−0,132	−1,924[b]	0,679	45,114[a]	67
81-82	0,760	6,560[a]	0,003	0,064	0,557	25,160[a]	63
82-83	1,272	7,157[a]	−0,092	−1,160	0,563	29,188[a]	71
83-84	1,934	7,369[a]	−0,043	−0,294	0,688	43,439[a]	62
84-85	0,796	5,329[a]	0,114	1,565	0,377	12,093[a]	63
85-86	0,999	5,701[a]	0,030	0,695	0,420	12,772[a]	56
86-87	1,632	5,333[a]	0,132	1,675	0,666	30,597[a]	49
87-88	1,118	3,867[a]	0,169	1,046	0,566	16,924[a]	42
88-89	1,003	4,051[a]	0,314	1,023	0,358	9,096[a]	52

Table 6.23: Regression results for two years combined for model CRUDE/1: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,379	3,875[a]	−0,276	−1,944[b]	0,165	6,899[a]	108
77-78	0,816	7,817[a]	−0,631	−4,036[a]	0,498	33,369[a]	104
78-79	0,794	5,195[a]	0,182	0,954	0,674	64,232[a]	96
79-80	1,388	7,007[a]	0,288	1,292	0,785	99,987[a]	85
80-81	0,338	1,206	1,392	3,223[a]	0,717	54,171[a]	67
81-82	0,272	1,746[b]	1,024	4,051[a]	0,664	39,576[a]	63
82-83	1,186	4,504[a]	0,011	0,028	0,555	28,278[a]	71
83-84	1,417	4,054[a]	0,775	1,661	0,705	46,978[a]	62
84-85	0,529	5,360[a]	0,453	4,278[a]	0,765	65,088[a]	63
85-86	1,237	5,426[a]	−0,138	−0,683	0,484	16,569[a]	56
86-87	1,393	3,905[a]	0,920	2,906[a]	0,718	39,002[a]	49
87-88	0,969	2,152[a]	0,388	0,656	0,543	15,450[a]	42
88-89	1,129	3,456[a]	−0,281	−0,619	0,305	7,178[a]	52

Table 6.24: Regression results for two years combined for model CRUDE/2: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-77	0,336	4,317[a]	−0,351	−2,122[a]	0,174	7,349[a]	108
77-78	0,629	7,041[a]	−0,540	−2,710[a]	0,445	27,013[a]	104
78-79	0,980	7,904[a]	−0,032	−0,134	0,730	83,854[a]	96
79-80	1,223	7,485[a]	0,023	0,077	0,778	95,837[a]	85
80-81	0,931	4,187[a]	0,505	1,069	0,665	42,408[a]	67
81-82	0,398	3,270[a]	1,236	4,678[a]	0,685	43,424[a]	63
82-83	1,209	5,579[a]	−0,052	−0,117	0,555	28,214[a]	71
83-84	1,621	5,934[a]	0,877	1,555	0,703	46,608[a]	62
84-85	0,518	9,151[a]	0,750	3,670[a]	0,797	78,656[a]	63
85-86	1,003	5,061[a]	0,180	0,530	0,434	13,528[a]	56
86-87	1,862	5,095[a]	0,235	0,367	0,661	29,901[a]	49
87-88	1,226	3,617[a]	−0,058	−0,074	0,548	15,761[a]	42
88-89	0,777	2,710[a]	0,118	0,157	0,245	5,289[a]	52

Table 6.25: Regression results for three years combined of model AC201/1: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,278	4,617[a]	0,028	0,888	0,356	17,906[a]	100
77-79	0,779	10,792[a]	0,007	0,348	0,740	85,418[a]	93
78-80	1,213	9,847[a]	−0,065	−1,705[b]	0,813	114,416[a]	82
79-81	1,196	7,608[a]	−0,116	−2,234[a]	0,752	59,682[a]	62
80-82	0,780	7,453[a]	−0,030	−0,723	0,756	53,840[a]	55
81-83	1,088	6,186[a]	−0,052	−0,656	0,603	27,827[a]	58
82-84	1,379	5,977[a]	−0,055	−0,490	0,607	26,720[a]	55
83-85	1,572	7,770[a]	0,144	1,477	0,691	41,773[a]	59
84-86	1,093	7,070[a]	0,020	0,373	0,608	24,329[a]	50
85-87	1,467	6,547[a]	0,046	0,731	0,703	33,128[a]	45
86-88	1,396	5,563[a]	0,055	0,519	0,683	25,111[a]	38
87-89	1,266	3,962[a]	0,287	1,173	0,650	19,155[a]	34

Table 6.26: Regression results for three years combined for model AC201/2: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,277	4,623[a]	0,029	0,915	0,356	17,842[a]	100
77-79	0,779	10,841[a]	0,008	0,362	0,740	85,429[a]	93
78-80	1,212	9,908[a]	−0,069	−1,761[b]	0,813	114,726[a]	82
79-81	1,199	7,661[a]	−0,119	−2,286[a]	0,753	59,921[a]	62
80-82	0,780	7,502[a]	−0,031	−0,754	0,757	53,890[a]	55
81-83	1,087	6,226[a]	−0,053	−0,668	0,603	27,804[a]	58
82-84	1,375	6,026[a]	−0,053	−0,473	0,606	26,689[a]	55
83-85	1,691	8,107[a]	0,081	0,729	0,685	40,584[a]	59
84-86	1,103	7,202[a]	0,017	0,311	0,611	24,585[a]	50
85-87	1,469	6,618[a]	0,053	0,822	0,705	33,381[a]	45
86-88	1,394	5,627[a]	0,068	0,607	0,684	25,238[a]	38
87-89	1,257	4,111[a]	0,347	1,360	0,655	19,581[a]	34

Table 6.27: Regression results for three years combined of model CRUDE/1: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,478	5,418[a]	−0,296	−2,310[a]	0,396	21,206[a]	100
77-79	0,925	9,840[a]	−0,242	−2,027[a]	0,751	90,461[a]	93
78-80	1,353	7,396[a]	−0,335	−1,521	0,811	113,002[a]	82
79-81	0,417	1,871[b]	1,077	3,169[a]	0,775	67,614[a]	62
80-82	0,280	2,125[a]	0,932	4,572[a]	0,823	80,780[a]	55
81-83	0,437	1,654	1,082	2,803[a]	0,644	33,184[a]	58
82-84	0,933	2,708[a]	0,731	1,536	0,620	28,243[a]	55
83-85	1,177	5,290[a]	0,601	3,051[a]	0,720	48,073[a]	59
84-86	1,187	6,066[a]	0,055	0,294	0,675	32,542[a]	50
85-87	1,427	5,409[a]	0,333	1,392	0,732	38,382[a]	45
86-88	1,093	3,016[a]	0,505	1,232	0,691	26,088[a]	38
87-89	1,452	3,765[a]	0,086	0,167	0,635	17,944[a]	34

Table 6.28: Regression results for three years combined for model CRUDE/2: additional hypotheses

Period	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
76-78	0,416	5,929[a]	−0,339	−2,335[a]	0,391	20,771[a]	100
77-79	0,887	11,163[a]	−0,373	−2,208[a]	0,759	94,269[a]	93
78-80	1,145	8,063[a]	−0,003	−0,010	0,804	107,785[a]	82
79-81	0,892	4,865[a]	0,495	1,283	0,737	55,017[a]	62
80-82	0,519	4,394[a]	0,744	3,013[a]	0,790	65,323[a]	55
81-83	0,694	3,448[a]	1,063	2,598[a]	0,643	33,089[a]	58
82-84	1,096	4,305[a]	0,885	1,699[b]	0,623	28,675[a]	55
83-85	1,314	6,822[a]	0,744	2,708[a]	0,709	45,525[a]	59
84-86	1,081	6,200[a]	0,098	0,290	0,605	24,028[a]	50
85-87	1,625	6,380[a]	−0,031	−0,069	0,716	35,215[a]	45
86-88	1,408	5,109[a]	0,059	0,107	0,672	23,859[a]	38
87-89	1,424	3,910[a]	0,268	0,296	0,635	18,000[a]	34

Table 6.29: Pooled regression results of annual data for model AC201/1: additional hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	1,005	13,854*	0,096	3,668*	0,363	155,464*	823
Negative GDP growth	0,861	9,228*	0,037	0,956	0,239	35,570*	342
Increasing GDP growth	1,059	11,398*	0,092	3,095*	0,409	125,459*	546
Declining GDP growth	0,922	13,047*	0,016	0,486	0,265	74,022*	619
With adjustment	1,324	8,117*	0,137	1,000	0,488	47,748*	153
Without adjustment	0,936	15,148*	0,077	3,799*	0,317	156,095*	1012
Delisted	1,237	8,774*	0,129	1,647	0,398	40,912*	189
All	0,990	16,859*	0,078	3,555*	0,329	189,495*	1165

Table 6.30: Pooled regression results of annual data for model AC201/2: additional hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	1,012	13,998*	0,095	3,565*	0,362	155,081*	823
Negative GDP growth	0,882	9,372*	0,028	0,693	0,241	35,901*	342
Increasing GDP growth	1,064	11,497*	0,093	3,072*	0,409	125,359*	546
Declining GDP growth	0,935	13,225*	0,008	0,236	0,266	74,487*	619
With adjustment	1,306	8,016*	0,187	1,266	0,491	48,151*	153
Without adjustment	0,943	15,273*	0,076	3,647*	0,316	155,264*	1012
Delisted	1,296	8,951*	0,105	1,257	0,394	40,267*	189
All	0,996	17,028*	0,077	3,417*	0,328	189,034*	1165

Table 6.31: Pooled regression results of annual data for model CRUDE/1: additional hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	0,731	8,120[a]	0,785	6,744[a]	0,385	171,261[a]	823
Negative GDP growth	0,793	7,421[a]	0,187	1,520	0,242	36,092[a]	342
Increasing GDP growth	0,835	7,481[a]	0,698	5,097[a]	0,422	132,295[a]	546
Declining GDP growth	0,801	9,497[a]	0,261	2,435[a]	0,270	76,037[a]	619
With adjustment	1,415	7,510[a]	−0,080	−0,325	0,483	46,649[a]	153
Without adjustment	0,731	9,963[a]	0,604	6,118[a]	0,331	167,001[a]	1012
Delisted	1,057	7,013[a]	0,441	3,206[a]	0,421	45,049[a]	189
All	0,813	11,656[a]	0,504	5,814[a]	0,341	199,987[a]	1165

Table 6.32: Pooled regression results of annual data for model CRUDE/2: additional hypotheses

Description	$\hat{\alpha}_1$	t-value	$\hat{\alpha}_2$	t-value	r^2	F-test	n
Positive GDP growth	0,904	10,627[a]	0,723	3,956[a]	0,364	156,266[a]	823
Negative GDP growth	0,768	7,391[a]	0,390	1,923[b]	0,243	36,365[a]	342
Increasing GDP growth	1,045	9,522[a]	0,593	2,612[a]	0,399	120,243[a]	546
Declining GDP growth	0,766	9,410[a]	0,540	3,214[a]	0,274	77,377[a]	619
With adjustment	1,460	7,514[a]	−0,297	−0,651	0,484	46,922[a]	153
Without adjustment	0,864	12,225[a]	0,506	3,483[a]	0,316	155,148[a]	1012
Delisted	1,098	7,008[a]	0,495	2,123[a]	0,403	41,920[a]	189
All	0,905	13,421[a]	0,541	3,887[a]	0,330	190,714[a]	1165

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CHAPTER SEVEN

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 SUMMARY

The primary purpose of this study was to evaluate the value of inflation-adjusted accounting income as perceived by investors by studying the relationship between these quantities and the behaviour of share prices. Any relationship found that will explain part of the behaviour of share prices will enhance the body of knowledge regarding share price behaviour. In addition, if one assumes that the share market is efficient in its semi-strong form, share prices should reflect all publicly available information, and by studying the relationship between various inflation adjustments to income and the behaviour of share prices, some insight may be obtained regarding the types of adjustment that the market is making to evaluate the effect of inflation on the financial results of companies.

Since the publication of inflation adjustments is not mandatory, and these data are in general not disclosed voluntarily, the inflation-adjusted income quantities had to be estimated. For this purpose a number of inflation accounting models were developed and applied to the published data of industrial companies listed on the Johannesburg Stock Exchange. Using the estimated inflation adjustments for the various companies, it was also possible to evaluate how companies were reacting to the continued high inflation rate in terms of their adjusted dividend covers. Since it is possible that the various inflation accounting models developed could measure basically the same phenomenon, it was first necessary to establish which of the models seemed to measure unique phenomena and thus warranted further investigation.

In Chapter Two the literature regarding the association between inflation-adjusted data and the behaviour of share prices was reviewed and classified according to the research design employed. A number of these research designs were clearly inappropriate for use in this study due to lack of available data or deficiencies in the design. Three designs did, however, seem appropriate for application in the research documented in this dissertation. The application of these designs followed in Chapters Four to Six.

The inflation accounting models used were developed and compared in Chapter Three. Two of the models were based on specific interpretations of AC201 (SAICA, 1978), while two other were based on a suggestion by Hamman (1986). The final two models can be considered as simple or one-line adjustment models. The models were applied to the accounting data of listed industrial companies and the estimated inflation adjustments were compared using the nonparametric Kruskal-Wallis analysis of variance. The following findings were arrived at.

* The two models based on the suggestion of Hamman (1986) do not differ significantly from a realistic interpretation of AC201, and hence they were not used in the further development of this dissertation.

* AC201 is open to a sufficiently wide interpretation that significantly different estimated inflation adjustments result.

* It seems as if the number of companies that display a real dividend cover of less than one has started to decrease. This can be interpreted as a signal that a number of companies are coming to terms with the effects of inflation.

The first of the studies that evaluated the share market's behaviour to inflation accounting data was constructed as an event study around the announcement of the abolition of the tax benefits associated with the LIFO method of inventory valuation. This was reported in Chapter Four. Although the direct relationship between an inflation-adjusted income quantity and the behaviour of share prices was not the prime focus of this chapter, it is of related interest. The LIFO method of inventory valuation can be seen as a component of inflation accounting which results in the reporting of a lower income quantity than that which would have been reported if inventories were valued on a FIFO basis. Prior to March 1984 this lower income resulted in a reduced tax charge and hence an improved cash flow for a company. The abolishment of this tax benefit should have affected the share prices of companies using the LIFO method of inventory valuation differently to those that did not use this method of inventory valuation. The findings of this chapter were as follows.

* No abnormal share market behaviour could be detected for a period of five months surrounding the date of the abolishment of the tax benefits.

* The inclusion of a company and its holding company in a sample lead to statistically significant results which disappeared when one of the two companies was removed from the sample. The event study methodology used is thus very sensitive to the sample formation and utmost care should be used in selecting companies for inclusion in such a study.

In Chapter Five the incremental information content approach was used to evaluate the relationship between inflation-adjusted income and the behaviour of share prices. The following findings were arrived at.

* Additive and multiplicative CARs based on bi-weekly residuals from the CAPM differ significantly, resulting in a preference for the mathematically correct multiplicative form.

* Little of the variability of the share return residuals is explained by either the historic cost income variable or the inflation-adjusted income variable or a combination of the two.

* The exclusion of company-year data associated with non-significant β-parameters of the CAPM from the analysis, generally results in higher coefficients of determination, but no difference in the findings.

* The collinearity of the two income variables causes problems in the interpretation of significance levels for this type of research design.

* The different interpretations of AC201, which lead to significantly different inflation adjustments to the disclosed income, do not lead to different patterns in the incremental information content of these quantities.

* For companies that have not made any attempt to account for the effect of inflation, the historic cost income variable seems to be a better explanatory variable than either of the two AC201-adjusted income variables in describing the annual cumulative residual share return over all three holding periods investigated.

* For companies that have not made any attempt to account for the effect of inflation, the historic cost income variable seems to contain incremental explanatory power over either of the two AC201-adjusted income variables for all three holding periods investigated.

* For companies that have not made any attempt to account for the effect of inflation, both the AC201-adjusted income variables seem to contain traces of incremental information over the historic cost income variable for the September holding period.

* For companies that have made some attempt to account for the effect of inflation, neither the historic cost variable nor the inflation-adjusted variable for any of the four inflation accounting models seem to contain incremental information over the other.

* For companies that have made some attempt to account for the effect of inflation, the highest coefficient of determination is obtained for the June holding period for all four inflation accounting models.

* For companies that have not made any attempt to account for the effect of inflation, the highest coefficient of determination is obtained for the September holding period for all four inflation accounting models.

* For companies that have made some attempt to account for the effect of inflation, the better explanatory variable of the annual cumulative residual share return for the June holding period is the inflation-adjusted income variable for the pessimistic AC201 model and the CRUDE/2 model, but the historic cost income variable for the other two inflation accounting models.

* For a number of models of inflation accounting and subdivisions of the data it seems as if for the June holding period the historic cost income variable is the better explanatory variable of the annual cumulative residual share return, but for the September holding period the inflation-adjusted income variable seems to be the better explanatory variable. This could indicate that the market participants made their own estimates regarding the impact of inflation on the companies' financial results after the publication of either the preliminary income announcements, or the release of the annual reports.

* The inflation-adjusted income variable for both the realistic AC201 model and the CRUDE/1 model, and companies without any disclosed inflation accounting information, contains incremental information over the historic cost income variable for the September holding period in a number of years. In a similar number of years, the historic cost income variable displays incremental information over the inflation-adjusted income variable.

* Based on the annual regressions for two of the models investigated, it can be stated that the inflation-adjusted income variable is as good an explanatory variable, if not better, of the residual share returns as the historic cost income variable.

The final empirical analysis that was performed to evaluate the relationship between inflation-adjusted income data and the behaviour of share prices was reported in Chapter Six. In this chapter the income measurement properties of the inflation-adjusted data, estimated according to the aforementioned models, were determined. Special care was taken to eliminate heteroscedasticity. The following findings were arrived at:

* For all four inflation accounting models the historic cost income variable performs according to expectations in approximately 50 percent of the periods investigated.

* The inflation adjustment to income according to the Model CRUDE/2 is the only one to display income measuring properties in a limited number of periods.

* The inflation adjustment to income according to both the AC201 models never display income measuring properties except for one period.

* More information is gleaned from the data by performing regressions on the data of each year separately than by pooling the data.

7.2 CONCLUSIONS

The results of the empirical analyses undertaken in this dissertation are not very conclusive and subject to a number of caveats. The conclusions will be listed and followed by a brief discussion of the caveats.

* Guideline AC201 of the South African Institute of Chartered Accountants can be interpreted in such a way that it leads to significantly different adjustments to income. The lack of clarity on the specific treatment of investments could be a contributing factor to the lack of disclosures according to this guideline.

* Estimated simple adjustments for inflation to the reported historic cost income can differ significantly from each other and those estimated according to AC201. Thus in an environment of limited inflation accounting disclosures it is possible that the various market participants evaluate the impact of inflation on the financial results of companies differently, leading to share market behaviour that may be more difficult to detect.

* The results of the share market's reaction to the abolition of the LIFO tax benefits

are so inconclusive, that a statement regarding the possible limited inefficiency of the JSE cannot even be made.

* The inclusion of both operating companies and holding companies in the same sample can lead to spurious results.

* Due to the lack of inflation accounting disclosures, the inflation-adjusted income becomes a factor in the determination of share prices only after the historic cost information has been disclosed.

* Historic cost income is an important factor in the determination of share prices.

* Since AC201 inflation adjustments do not contain income measuring properties, its validity as a guideline for inflation accounting is suspect.

* The limited income measuring properties of the CRUDE/2 model indicates that holding gains information is possibly used in determining share prices.

In stating the above conclusions and lack of conclusions, it is necessary to see them in the light of the limitations of the various research designs and estimation procedures employed.

In estimating the inflation adjustments for the various models, the consumer price index was used for all companies. Although some of the more specific indices are highly correlated with the CPI, better results could possible have been obtained if more specific indices could have been used in the estimation process. The difficulty would be to determine the most appropriate index to use for each industrial company, or even for different asset categories of the same company.

One of the adjustments required by AC201 is the additional depreciation adjustment. In order to determine this adjustment, the average age of assets had to be estimated. There are indications (Daniel, 1992) that by dividing the accumulated depreciation by the current depreciation to obtain the average age, incorrect estimates can be made. This seems to be specifically severe if assets are not replaced according to a regular pattern. Additional problems can crop up if the cost price of fixed assets and the accumulated depreciation have been adjusted by different percentages in the revaluation process. Short (1985) suggested the use of a layering technique to estimate the average age of assets, but that method is very cumbersome.

The research design used in the event study of Chapter Four was shown by Brown and Warner (1980) to be powerful enough to distinguish abnormal behaviour of at least 5% with almost certainty. With lower percentages of abnormal behaviour the likelihood of detecting them is reduced. It is possible that the average LIFO tax benefit of the whole sample was too small to detect.

The lack of conclusive evidence from the incremental information content perspective could, apart from the aforementioned dilemmas with the accounting models, also be flawed due to the use of the CAPM, cross-sectional dependency, heteroscedasticity as well as collinearity of the variables. It was attempted to control for these factors, but the controls could have been insufficient.

The analysis of the data from an income measuring perspective could also have been flawed due to the estimation problems with the inflation accounting models. Although the potential heteroscedasticity of the data was treated in an econometrically acceptable manner, it was based on the assumption that the deflator used should be related to the opening market value of equity. In addition evidence of collinearity amongst the explanatory variables was also noticed.

An additional factor that may have obscured the research findings, is the foreign exchange control in South Africa that places severe limitations on investors to invest abroad. As a result much of the investment money is channelled to the JSE and most likely leading to inflated share prices for those securities in which the large investors invest (Cloete, 1992). It may also be a cause of thin trading and hence the share prices may not necessarily represent the intrinsic value of many of the shares.

All these caveats clearly indicate that additional research on this topic is required.

7.3 RECOMMENDATIONS

The limited significance of the results in this study certainly do not indicate that inflation accounting is useless. The lack of a suitable inflation accounting standard made the estimation of inflation adjustments necessary and this could have lead to the limited results. It is thus strongly recommended that the South African Institute of Chartered Accountants develop a clear, unambiguous statement on inflation accounting which should be made mandatory for at least all public companies. This should be followed by an intensive research project on the value of the data generated under such a statement.

The value of inflation-adjusted accounting data is not only dependent on the share market's reaction. Further research should be conducted regarding the usefulness of inflation-adjusted data in various financial decisions, for example, bankruptcy prediction, the dividend decision, the assessment of a share's risk, the use in mergers and takeovers. If estimated inflation adjustments have to be used, an attempt should be made to develop better estimates by using, for example, more industry specific indices, and better estimates of the average age of assets.

The share market's reaction to voluntary disclosed inflation accounting data should also be evaluated. Although only a few companies have disclosed such data, they could be subjected to market related studies. Rather than studying inflation adjustments in general, some information may also be gleaned by evaluating the individual components of the inflation adjustments as Matolcsy (1986) has done.

In evaluating the association between inflation accounting data and the share market's behaviour, specific attention should in further research be given to the way in which the share returns are modelled. In lieu of the CAPM an arbitrage pricing theory model could be used since Page (1989) found that such a model was better specified on the JSE than the CAPM.

Closely associated to the problem of inflation accounting and its usefulness is the usefulness of cash flow information. Since cash flow information is disclosed mandatorily, its relevance in the context of share price determination could be a useful area of research.

A study of the financial structure of industrial companies over a period of time could also be useful in understanding how companies cope with inflation. If a company's real dividend cover is less than one over an extended period, it is likely that it will require additional funding to be able to continue doing business. Thus by studying funding requirements relative to real dividend covers, further insights into the problems caused by inflation may be obtained.

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Appendix A.1

Example of Model AC201/1 computer printout

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM A

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
2 STOCKS	116373	87129	22884	19533	19664	21595	42341	50873	26778	18938
3 INVESTMENTS MV > BV	0	0	0	0	0	0	0	0	0	0
4 GOODWILL	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0
6 TOTAL NON-MONETARY ASSETS	266050	214271	83503	77298	74590	77157	101950	110605	73814	52369
7 LONG TERM LOANS	35200	18898	11485	12166	12814	14833	24521	24455	25018	17225
8 CURRENT LIABILITIES	165351	121323	49884	33833	39499	41157	44540	50750	24650	21650
9 CURRENT ASSETS - STOCKS	-121358	-91987	-24664	-31756	-31255	-29532	-35335	-37283	-25404	-19155
10 LOAN LEVIES	0	0	0	0	-206	-371	-548	-679	-623	-631
11 INVESTMENTS MV <= BV	-6290	-4806	-64640	-32009	-30635	-29205	-2315	-1990	-1981	-1992
12	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	0	0	0	0
14 NET MONETARY LIABILITIES	72903	43428	-27935	-17766	-9783	-3118	30863	35253	21660	17097
15 SHAREHOLDERS INTEREST	122862	110905	99164	89405	77841	73990	45677	45899	40364	31024
16 CONVERTIBLE LONG TERM LOANS	0	0	0	0	6802	6802	6802	6802	6802	0
17 OUTSIDE INTEREST	43583	39823	39	40	42	42	9306	8902	44	41
18 PREFERENCE SHARES	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050
19 DEFERRED TAXATION	25652	19065	11185	4569	-1362	-1609	8252	12699	3894	3157
20 AC201 EQUITY	193147	170843	111438	95064	84373	80275	71087	75352	52154	35272
21 REVALUATION	0	0	0	0	0	0	0	0	0	0
22 GEARING RATIO	.242194	.052029	.000000	.000000	.000000	.154907	.311054	.308607	.307149	.356001
23 LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	2378	3091	1867	3070
24 ACC LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	10406	8028	4937	3070
25 TOTAL STOCKS : FIFO	116373	87129	22884	19533	19664	21595	52747	58901	31715	22008

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM 8

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 ACCUMULATED DEPRECIATION	77241	67672	22228	18922	15916	16028	30594	21232	16440	13427
2 CURRENT DEPRECIATION	11836	9568	4987	4285	3853	3457	5539	5028	3228	2465
3 FACTOR(1/2)	5.00000	5.00000	4.45719	4.41587	4.13081	4.63639	5.00000	4.22275	5.00000	5.00000
4 BALANCE SHEET DATE - 3 = PURCHASE DATE	84/06	83/06	83/01	82/01	81/04	79/10	78/06	78/03	76/06	75/06
5 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
6 INDEX ON PURCHASE DATE	85.6	76.6	73.2	63.9	57.7	47.9	39.4	38.7	32.6	29.3
7 FACTOR (5/6-1.0)	1.076804	1.004065	.867282	.822908	.727273	.787419	.944664	.761394	.805423	.751773
8 ADDITIONAL DEPRECIATION	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
A ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
B DEFICIT	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
9 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
10 REVALUATION FIXED ASSETS	0	0	0	0	0	0	0	0	0	0
11 OPENING STOCK	6025	1556	1784	1588	1349	2501	3541	2577	1937	1124
12 CLOSING STOCK	8840	4359	1583	1479	1721	1336	2966	4034	1596	1336
13 STOCK ADJUSTMENT	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
14 OPENING NET MON. ASSETS	0	0	-1623	-790	-194	0	0	0	0	0
15 CLOSING NET MON. ASSETS	0	0	-1932	-1345	-856	0	0	0	0	0
16 NET MON. ASSETS LOSS	0	0	-3555	-2135	-1050	0	0	0	0	0
17 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
18 INDEX AT MIDDLE OF FIN YEAR	164.2	145.9	127.2	107.7	90.9	80.3	72.3	63.6	55.8	48.2
19 INDEX AT START OF FIN YEAR	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3	44.8

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM C

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2A DEFICIT ON ADD. DEPR.	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
2B ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
2C TOTAL = 2A+2B	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
3A STOCK ADJUSTMENT:LIFO	0	0	0	0	0	0	2378	3091	1867	3070
3B STOCK ADJUSTMENT:TOTAL	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
3C STOCK ADJUSTMENT:NETT	14865	5915	3367	3067	3070	3837	4129	3520	1666	-610
4 2C + 3B	27610	15521	7692	6593	5872	6559	11739	10439	6132	4313
5 GEARING RATIO	.242194	.052029	.000000	.000000	.000000	.154907	.311054	.308607	.307149	.356001
6A GEARING ADJUSTMENT	6686	807	0	0	0	1016	3651	3221	1883	1535
6B TOTAL LOSS ON NMA	0	0	-3555	-2135	-1050	0	0	0	0	0
7 TOTAL ADJUSTMENT	20924	14714	11247	8728	6922	5543	5710	4127	2382	-292
8 ADJUSTED INCOME	7038	7276	-3575	-2653	-1558	803	-2982	4960	8374	7299
9 PERCENT ADJUST. (AFTER TAX)	74.83	66.91	146.60	143.67	129.05	87.35	209.31	45.42	22.15	-4.17
10 INCOME BEFORE TAXATION	48610	38511	12556	10410	8904	10456	1302	13418	15395	8857
11 PERCENT ADJUST.(BEFORE TAX)	43.04	38.21	89.57	83.84	77.74	53.01	438.56	30.76	15.47	-3.30
12 AC201 ADD. DEPRECIATION	0	0	0	0	0	0	0	0	0	0
13 AC201 STOCK ADJUSTMENT	0	0	0	0	0	0	0	0	0	0
14 AC201 GEARING ADJUSTMENT	0	0	0	0	0	0	0	0	0	0
15 AC201 INCOME	0	0	0	0	0	0	0	0	0	0

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM D

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2	0	0	0	0	0	0	0	0	0	0
3 EARNINGS ASSOC COYS	69	386	3477	2710	1377	-310	0	4	105	135
4 OUTSIDE INTEREST	-7636	-4978	1	2	0	0	-790	-276	-5	0
5 PREFERRED DIVIDENDS	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
6 AVAILABLE FOR EQUITY	20340	17343	11095	8732	6686	5981	1883	8760	10801	7087
7 ORDINARY DIVIDENDS	7406	6247	4787	4119	3202	2896	2818	2958	3549	2638
HISTORICAL DIVIDEND COVERS:										
8 FACTS	2.80	2.80	2.30	2.20	1.90	2.10	.70	3.10	3.40	3.20
9 BEFORE EXTRAORDINARY ITEMS	2.75	2.78	2.32	2.12	2.09	2.07	.67	2.96	3.04	2.69
10 AFTER EX. ITEMS	2.75	2.74	2.29	2.16	2.30	4.71	.99	3.78	3.00	2.64
11 EX EARNINGS ASSOC COYS	2.74	2.71	1.59	1.46	1.66	2.17	.67	2.96	3.01	2.64
12 PERCENT INCOME ADJUSTMENT	74.83	66.91	.04	.04	.05	.06	100.00	45.42	22.15	.13
13 ADJUSTMENT : OUTSIDE INTEREST (12 X 4)	5714	3330	4	3	3	3	790	125	1	0
14 TOTAL ADJUSTMENT	-20924	-14714	-11247	-8728	-6922	-5543	-5710	-4127	-2382	292
15 AVAILABLE FOR EQUITY:AC201	5130	5959	-148	7	-233	441	-3037	4758	8420	7379
16 ADJUSTED DIVIDEND COVER	.69	.95	-.03	.00	-.07	.15	-1.08	1.61	2.37	2.80
17 ADJ. COVER (DEF. TAX)	1.35	1.25	1.02	.98	.41	.51	-2.79	2.73	3.20	2.94
17A ADJ. DIV COV (ASSOC COYS)	.68	.89	-.76	-.66	-.50	.26	-1.08	1.61	2.34	2.75

Appendix A.2

Example of Model AC201/2 computer printout

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM A

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
2 STOCKS	116373	87129	22884	19533	19664	21595	42341	50873	26778	18938
3 INVESTMENTS MV > BV	0	0	0	0	0	0	0	0	0	0
4 GOODWILL	0	0	0	0	0	0	0	0	0	0
5 INVESTMENTS MV<=BV	6290	4806	64640	32009	30635	29205	2315	1990	1981	1992
5A LOAN LEVIES	0	0	0	0	206	371	548	679	623	631
6 TOTAL NON-MONETARY ASSETS	272340	219077	148143	109307	105431	106733	104813	113274	76418	54992
7 LONG TERM LOANS	35200	18898	11485	12166	12814	14833	24521	24455	25018	17225
8 CURRENT LIABILITIES	165351	121323	49884	33833	39499	41157	44540	50750	24650	21650
9 CURRENT ASSETS - STOCKS	-121358	-91987	-24664	-31756	-31255	-29532	-35335	-37283	-25404	-19155
10	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	0	0	0	0
12 NON-CONV. PREF. SHARES	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050
13	0	0	0	0	0	0	0	0	0	0
14 NET MONETARY LIABILITIES	80243	49284	37755	15293	22108	27508	34776	38972	25314	20770
15 SHAREHOLDERS INTEREST	122862	110905	99164	89405	77841	73990	45677	45899	40364	31024
16 CONVERTIBLE LONG TERM LOANS	0	0	0	0	6802	6802	6802	6802	6802	0
17 OUTSIDE INTEREST	43583	39823	39	40	42	42	9306	8902	44	41
18 CONVERT. PREF. SHARES	0	0	0	0	0	0	0	0	0	0
19 DEFERRED TAXATION	25652	19065	11185	4569	-1362	-1609	8252	12699	3894	3157
20 AC201 EQUITY	192097	169793	110388	94014	83323	79225	70037	74302	51104	34222
21 REVALUATION	0	0	0	0	0	0	0	0	0	0
22 GEARING RATIO	.263579	.237021	.206052	.174170	.233857	.294423	.338159	.338897	.350689	.412727
23 LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	2378	3091	1867	3070
24 ACC LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	10406	8028	4937	3070
25 TOTAL STOCKS : FIFO	116373	87129	22884	19533	19664	21595	52747	58901	31715	22008

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM B

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 ACCUMULATED DEPRECIATION	77241	67672	22228	18922	15916	16028	30594	21232	16440	13427
2 CURRENT DEPRECIATION	11836	9568	4987	4285	3853	3457	5539	5028	3228	2465
3 FACTOR(1/2)	5.00000	5.00000	4.45719	4.41587	4.13081	4.63639	5.00000	4.22275	5.00000	5.00000
4 BALANCE SHEET DATE - 3 = PURCHASE DATE	84/06	83/06	83/01	82/01	81/04	79/10	78/06	78/03	76/06	75/06
5 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
6 INDEX ON PURCHASE DATE	85.6	76.6	73.2	63.9	57.7	47.9	39.4	38.7	32.6	29.3
7 FACTOR (5/6-1.0)	1.076804	1.004065	.867282	.822908	.727273	.787419	.944664	.761394	.805423	.751773
8 ADDITIONAL DEPRECIATION	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
A ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
B DEFICIT	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
9 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
10 REVALUATION FIXED ASSETS	0	0	0	0	0	0	0	0	0	0
11 OPENING STOCK	6025	1556	1784	1588	1349	2501	3541	2577	1937	1124
12 CLOSING STOCK	8840	4359	1583	1479	1721	1336	2966	4034	1596	1336
13 STOCK ADJUSTMENT	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
14 OPENING NET MON. ASSETS	0	0	0	0	0	0	0	0	0	0
15 CLOSING NET MON. ASSETS	0	0	0	0	0	0	0	0	0	0
16 NET MON. ASSETS LOSS	0	0	0	0	0	0	0	0	0	0
17 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
18 INDEX AT MIDDLE OF FIN YEAR	164.2	145.9	127.2	107.7	90.9	80.3	72.3	63.6	55.8	48.2
19 INDEX AT START OF FIN YEAR	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3	44.8

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM C

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2A DEFICIT ON ADD. DEPR.	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
2B ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
2C TOTAL = 2A+2B	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
3A STOCK ADJUSTMENT:LIFO	0	0	0	0	0	0	2378	3091	1867	3070
3B STOCK ADJUSTMENT:TOTAL	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
3C STOCK ADJUSTMENT:NETT	14865	5915	3367	3067	3070	3837	4129	3520	1666	-610
4 2C + 3B	27610	15521	7692	6593	5872	6559	11739	10439	6132	4313
5 GEARING RATIO	.263579	.237021	.206052	.174170	.233857	.294423	.338159	.338897	.350689	.412727
6A GEARING ADJUSTMENT	7277	3678	1584	1148	1373	1931	3969	3537	2150	1780
6B TOTAL LOSS ON NMA	0	0	0	0	0	0	0	0	0	0
7 TOTAL ADJUSTMENT	20333	11843	6108	5445	4499	4628	5392	3811	2115	-537
8 ADJUSTED INCOME	7629	10147	1564	630	865	1718	-2664	5276	8641	7544
9 PERCENT ADJUST. (AFTER TAX)	72.72	53.86	79.61	89.63	83.87	72.93	197.65	41.94	19.66	-7.66
10 INCOME BEFORE TAXATION	48610	38511	12556	10410	8904	10456	1302	13418	15395	8857
11 PERCENT ADJUST.(BEFORE TAX)	41.83	30.75	48.65	52.31	50.53	44.26	414.13	28.40	13.74	-6.06
12 AC201 ADD. DEPRECIATION	0	0	0	0	0	0	0	0	0	0
13 AC201 STOCK ADJUSTMENT	0	0	0	0	0	0	0	0	0	0
14 AC201 GEARING ADJUSTMENT	0	0	0	0	0	0	0	0	0	0
15 AC201 INCOME	0	0	0	0	0	0	0	0	0	0

FINANCIAL RESULTS ACCORDING TO GUIDELINE AC201 - V8A/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING　　COMPANY 03453 : CULLINAN HOLDINGS

FORM D

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2	0	0	0	0	0	0	0	0	0	0
3 EARNINGS ASSOC COYS	69	386	3477	2710	1377	-310	0	4	105	135
4 OUTSIDE INTEREST	-7636	-4978	1	2	0	0	-790	-276	-5	0
5 PREFERRED DIVIDENDS	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
6 AVAILABLE FOR EQUITY	20340	17343	11095	8732	6686	5981	1883	8760	10801	7087
7 ORDINARY DIVIDENDS	7406	6247	4787	4119	3202	2896	2818	2958	3549	2638
HISTORICAL DIVIDEND COVERS:	*									
8 FACTS	2.80	2.80	2.30	2.20	1.90	2.10	.70	3.10	3.40	3.20
9 BEFORE EXTRAORDINARY ITEMS	2.75	2.78	2.32	2.12	2.09	2.07	.67	2.96	3.04	2.69
10 AFTER EX. ITEMS	2.75	2.74	2.29	2.16	2.30	4.71	.99	3.78	3.00	2.64
11 EX EARNINGS ASSOC COYS	2.74	2.71	1.59	1.46	1.66	2.17	.67	2.96	3.01	2.64
12 PERCENT INCOME ADJUSTMENT	72.72	53.86	.04	.04	.05	.06	100.00	41.94	19.66	.13
13 ADJUSTMENT : OUTSIDE INTEREST (12 X 4)	5552	2680	2	2	2	2	790	115	0	0
14 TOTAL ADJUSTMENT	-20333	-11843	-6108	-5445	-4499	-4628	-5392	-3811	-2115	537
15 AVAILABLE FOR EQUITY:AC201	5559	8180	4989	3289	2189	1355	-2719	5064	8686	7624
16 ADJUSTED DIVIDEND COVER	.75	1.31	1.04	.80	.68	.47	-.96	1.71	2.45	2.89
17 ADJ. COVER (DEF. TAX)	1.40	1.60	2.10	1.77	1.17	.82	-2.68	2.83	3.28	3.04
17A ADJ. DIV COV (ASSOC COYS)	.74	1.25	.32	.14	.25	.57	-.96	1.71	2.42	2.84

Appendix A.3

Example of Model NEUTRL/1 computer printout

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM A

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
MONETARY ASSETS										
1 DEBTORS	120209	88772	21440	30712	30159	27815	32862	34528	23452	17705
2 LOANS	0	0	0	0	0	0	0	0	0	0
3 DEPOSITS	0	0	0	0	0	0	0	0	0	0
4										
5 OTHER CURRENT ASSETS	1034	1068	971	1001	980	1663	2357	2565	1888	1175
6 TOTAL MONETARY ASSETS	121243	89840	22411	31713	31139	29478	35219	37093	25340	18880
MONETARY LIABILITIES										
7 LONG TERM LOANS	35200	18898	11485	12166	12814	14833	24521	24455	25018	17225
8 NON-CONVERT. PREF. SHARES	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050
9 CREDITORS	103804	85623	31550	27885	31822	34827	24582	24610	12197	12238
10										
11 SHORT TERM LOANS	24401	13878	14381	2206	2020	1514	16424	19556	2867	6143
12 TAXES	11510	13345	605	899	991	2252	1941	606	1198	946
13 DIVIDENDS	9826	8477	3348	2843	1976	1622	1593	1709	2393	1703
14 OTHER CURRENT LIABILITIES	0	0	0	0	0	0	0	0	0	0
15 TOTAL MONETARY LIABILITIES	185791	141271	62419	47049	50673	56098	70111	71986	44723	39305
16 STOCKS	116373	87129	22884	19533	19664	21595	42341	50873	26778	18938
17 LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	2378	3091	1867	3070
18 ACC. LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	10406	8028	4937	3070
19 TOTAL STOCKS : FIFO	116373	87129	22884	19533	19664	21595	52747	58901	31715	22008
20 EQUITY	122862	110905	99164	89405	77841	73990	45677	45899	40364	31024
21 MINORITY INTEREST	43583	39823	39	40	42	42	9306	8902	44	41

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM B

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 ACCUMULATED DEPRECIATION	77241	67672	22228	18922	15916	16028	30594	21232	16440	13427
2 CURRENT DEPRECIATION	11836	9568	4987	4285	3853	3457	5539	5028	3228	2465
3 FACTOR(1/2)	5.00000	5.00000	4.45719	4.41587	4.13081	4.63639	5.00000	4.22275	5.00000	5.00000
4 BALANCE SHEET DATE - 3 = PURCHASE DATE	84/06	83/06	83/01	82/01	81/04	79/10	78/06	78/03	76/06	75/06
5 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
6 INDEX ON PURCHASE DATE	85.6	76.6	73.2	63.9	57.7	47.9	39.4	38.7	32.6	29.3
7 FACTOR (5/6-1.0)	1.076804	1.004065	.867282	.822908	.727273	.787419	.944664	.761394	.805423	.751773
8 ADDITIONAL DEPRECIATION	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
A ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
B DEFICIT	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
9 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
10 REVALUATION FIXED ASSETS	0	0	0	0	0	0	0	0	0	0
11 OPENING STOCK	6025	1556	1784	1588	1349	2501	3541	2577	1937	1124
12 CLOSING STOCK	8840	4359	1583	1479	1721	1336	2966	4034	1596	1336
13 STOCK ADJUSTMENT	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
14 OPENING MON. ASSETS ADJ.	6212	1524	2897	2515	1842	1670	2230	2059	1662	919
15 CLOSING MON. ASSETS ADJ.	9210	4495	1550	2402	2726	1824	1980	2540	1275	1146
16 TOTAL MON. ASSETS ADJUST.	15422	6019	4447	4917	4568	3494	4210	4599	2937	2065
17 OPENING MON. LIABIL. ADJ.	9769	4246	4298	4092	3506	3325	4327	3634	3461	2217
18 CLOSING MON. LIABIL. ADJ.	14114	7068	4317	3564	4436	3472	3942	4930	2251	2386
19 TOTAL MON. LIABIL. ADJUST.	23883	11314	8615	7656	7942	6797	8269	8564	5712	4603
20 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
21 INDEX AT MIDDLE OF FIN YEAR	164.2	145.9	127.2	107.7	90.9	80.3	72.3	63.6	55.8	48.2
22 INDEX AT START OF FIN YEAR	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3	44.8

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM C

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2A DEFICIT ON ADD. DEPR.	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
3A STOCK ADJUSTMENT:LIFO	0	0	0	0	0	0	2378	3091	1867	3070
3B STOCK ADJUSTMENT:TOTAL	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
3C STOCK ADJUSTMENT:NETT	14865	5915	3367	3067	3070	3837	4129	3520	1666	-610
4 MON. ASSET ADJUSTMENT	15422	6019	4447	4917	4568	3494	4210	4599	2937	2065
5 MON. LIABILITY ADJUSTMENT	23883	11314	8615	7656	7942	6797	8269	8564	5712	4603
6 TOTAL ADJUSTMENT	19149	10226	3524	3854	2498	3256	5302	3383	1490	-1295
7 ADJUSTED INCOME	8813	11764	4148	2221	2866	3090	-2574	5704	9266	8302
8 PERCENT ADJUST. (AFTER TAX)	68.48	46.50	45.93	63.44	46.57	51.31	194.35	37.23	13.85	-18.48
9 INCOME BEFORE TAXATION	48610	38511	12556	10410	8904	10456	1302	13418	15395	8857
10 PERCENT ADJUST.(BEFORE TAX)	39.39	26.55	28.07	37.02	28.05	31.14	407.22	25.21	9.68	-14.62

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM D

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2	0	0	0	0	0	0	0	0	0	0
3 EARNINGS ASSOC. COYS	69	386	3477	2710	1377	-310	0	4	105	135
4 OUTSIDE INTEREST	-7636	-4978	1	2	0	0	-790	-276	-5	0
5 PREFERRED DIVIDENDS	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
6 AVAILABLE FOR EQUITY	20340	17343	11095	8732	6686	5981	1883	8760	10801	7087
7 ORDINARY DIVIDENDS	7406	6247	4787	4119	3202	2896	2818	2958	3549	2638
HISTORICAL DIVIDEND COVERS:										
8 FACTS	2.80	2.80	2.30	2.20	1.90	2.10	.70	3.10	3.40	3.20
9 BEFORE EXTRAORDINARY ITEMS	2.75	2.78	2.32	2.12	2.09	2.07	.67	2.96	3.04	2.69
10 AFTER EX. ITEMS	2.75	2.74	2.29	2.16	2.30	4.71	.99	3.78	3.00	2.64
11 EX ASSOCIATED CO EARNINGS	2.74	2.71	1.59	1.46	1.66	2.17	.67	2.96	3.01	2.64
12 PERCENT INCOME ADJUSTMENT	68.48	46.50	.04	.04	.05	.06	100.00	37.23	13.85	.13
13 ADJUSTMENT : OUTSIDE INTEREST (12 X 4)	5229	2314	0	0	0	0	790	102	0	0
14 TOTAL ADJUSTMENT	-19149	-10226	-3524	-3854	-2498	-3256	-5302	-3383	-1490	1295
15 AVAILB. FOR EQUITY:1-2-3-4	6420	9431	7571	4878	4188	2725	-2629	5479	9311	8382
16 ADJUSTED DIVIDEND COVER	.87	1.51	1.58	1.18	1.31	.94	-.93	1.85	2.62	3.18
17 ADJ. COVER (DEF. TAX)	1.52	1.80	2.64	2.16	1.79	1.30	-2.65	2.97	3.45	3.32
18 EX ASSOCIATED CO EARNINGS	.86	1.45	.86	.53	.88	1.05	-.93	1.85	2.59	3.13

Appendix A.4

Example of Model NEUTRL/2 computer printout

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM A

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
MONETARY ASSETS										
1 DEBTORS	120209	88772	21440	30712	30159	27815	32862	34528	23452	17705
2 LOANS	0	0	0	0	0	0	0	0	0	0
3 DEPOSITS	0	0	0	0	0	0	0	0	0	0
4 CASH	115	2147	2253	43	116	54	116	190	64	275
5 OTHER CURRENT ASSETS	1034	1068	971	1001	980	1663	2357	2565	1888	1175
6 TOTAL MONETARY ASSETS	121358	91987	24664	31756	31255	29532	35335	37283	25404	19155
MONETARY LIABILITIES										
7 LONG TERM LOANS	35200	18898	11485	12166	12814	14833	24521	24455	25018	17225
8 NON-CONVERT. PREF. SHARES	1050	1050	1050	1050	1050	1050	1050	1050	1050	1050
9 CREDITORS	103804	85623	31550	27885	31822	34827	24582	24610	12197	12238
10 OVERDRAFT	15810	0	0	0	2690	942	0	4269	5995	620
11 SHORT TERM LOANS	24401	13878	14381	2206	2020	1514	16424	19556	2867	6143
12 TAXES	11510	13345	605	899	991	2252	1941	606	1198	946
13 DIVIDENDS	9826	8477	3348	2843	1976	1622	1593	1709	2393	1703
14 OTHER CURRENT LIABILITIES	0	0	0	0	0	0	0	0	0	0
15 TOTAL MONETARY LIABILITIES	201601	141271	62419	47049	53363	57040	70111	76255	50718	39925
16 STOCKS	116373	87129	22884	19533	19664	21595	42341	50873	26778	18938
17 LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	2378	3091	1867	3070
18 ACC. LIFO STOCK ADJUSTMENT	0	0	0	0	0	0	10406	8028	4937	3070
19 TOTAL STOCKS : FIFO	116373	87129	22884	19533	19664	21595	52747	58901	31715	22008
20 EQUITY	122862	110905	99164	89405	77841	73990	45677	45899	40364	31024
21 MINORITY INTEREST	43583	39823	39	40	42	42	9306	8902	44	41

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING — COMPANY 03453 : CULLINAN HOLDINGS

FORM B

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 ACCUMULATED DEPRECIATION	77241	67672	22228	18922	15916	16028	30594	21232	16440	13427
2 CURRENT DEPRECIATION	11836	9568	4987	4285	3853	3457	5539	5028	3228	2465
3 FACTOR(1/2)	5.00000	5.00000	4.45719	4.41587	4.13081	4.63639	5.00000	4.22275	5.00000	5.00000
4 BALANCE SHEET DATE - 3 = PURCHASE DATE	84/06	83/06	83/01	82/01	81/04	79/10	78/06	78/03	76/06	75/06
5 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
6 INDEX ON PURCHASE DATE	85.6	76.6	73.2	63.9	57.7	47.9	39.4	38.7	32.6	29.3
7 FACTOR (5/6-1.0)	1.076804	1.004065	.867282	.822908	.727273	.787419	.944664	.761394	.805423	.751773
8 ADDITIONAL DEPRECIATION	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
A ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
B DEFICIT	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
9 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
10 REVALUATION FIXED ASSETS	0	0	0	0	0	0	0	0	0	0
11 OPENING STOCK	6025	1556	1784	1588	1349	2501	3541	2577	1937	1124
12 CLOSING STOCK	8840	4359	1583	1479	1721	1336	2966	4034	1596	1336
13 STOCK ADJUSTMENT	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
14 OPENING MON. ASSETS ADJ.	6361	1678	2901	2524	1845	1675	2241	2064	1686	928
15 CLOSING MON. ASSETS ADJ.	9219	4602	1706	2405	2736	1827	1986	2553	1279	1163
16 TOTAL MON. ASSETS ADJUST.	15580	6280	4607	4929	4581	3502	4227	4617	2965	2091
17 OPENING MON. LIABIL. ADJ.	9769	4246	4298	4310	3565	3325	4584	4121	3515	2470
18 CLOSING MON. LIABIL. ADJ.	15315	7068	4317	3564	4671	3530	3942	5222	2553	2424
19 TOTAL MON. LIABIL. ADJUST.	25084	11314	8615	7874	8236	6855	8526	9343	6068	4894
20 INDEX ON BALANCE SHEET DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
21 INDEX AT MIDDLE OF FIN YEAR	164.2	145.9	127.2	107.7	90.9	80.3	72.3	63.6	55.8	48.2
22 INDEX AT START OF FIN YEAR	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3	44.8

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM C

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2A DEFICIT ON ADD. DEPR.	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
3A STOCK ADJUSTMENT:LIFO	0	0	0	0	0	0	2378	3091	1867	3070
3B STOCK ADJUSTMENT:TOTAL	14865	5915	3367	3067	3070	3837	6507	6611	3533	2460
3C STOCK ADJUSTMENT:NETT	14865	5915	3367	3067	3070	3837	4129	3520	1666	-610
4 MON. ASSET ADJUSTMENT	15580	6280	4607	4929	4581	3502	4227	4617	2965	2091
5 MON. LIABILITY ADJUSTMENT	25084	11314	8615	7874	8236	6855	8526	9343	6068	4894
6 TOTAL ADJUSTMENT	18106	10487	3684	3648	2217	3206	5062	2622	1162	-1560
7 ADJUSTED INCOME	9856	11503	3988	2427	3147	3140	-2334	6465	9594	8567
8 PERCENT ADJUST. (AFTER TAX)	64.75	47.69	48.02	60.05	41.33	50.52	185.56	28.85	10.80	-22.26
9 INCOME BEFORE TAXATION	48610	38511	12556	10410	8904	10456	1302	13418	15395	8857
10 PERCENT ADJUST.(BEFORE TAX)	37.25	27.23	29.34	35.04	24.90	30.66	388.79	19.54	7.55	-17.61

FINANCIAL RESULTS ACCORDING TO METHOD 1-2-3-4 - V7D/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING COMPANY 03453 : CULLINAN HOLDINGS

FORM D

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2	0	0	0	0	0	0	0	0	0	0
3 EARNINGS ASSOC. COYS	69	386	3477	2710	1377	-310	0	4	105	135
4 OUTSIDE INTEREST	-7636	-4978	1	2	0	0	-790	-276	-5	0
5 PREFERRED DIVIDENDS	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
6 AVAILABLE FOR EQUITY	20340	17343	11095	8732	6686	5981	1883	8760	10801	7087
7 ORDINARY DIVIDENDS	7406	6247	4787	4119	3202	2896	2818	2958	3549	2638
HISTORICAL DIVIDEND COVERS:										
8 FACTS	2.80	2.80	2.30	2.20	1.90	2.10	.70	3.10	3.40	3.20
9 BEFORE EXTRAORDINARY ITEMS	2.75	2.78	2.32	2.12	2.09	2.07	.67	2.96	3.04	2.69
10 AFTER EX. ITEMS	2.75	2.74	2.29	2.16	2.30	4.71	.99	3.78	3.00	2.64
11 EX ASSOCIATED CO EARNINGS	2.74	2.71	1.59	1.46	1.66	2.17	.67	2.96	3.01	2.64
12 PERCENT INCOME ADJUSTMENT	64.75	47.69	.04	.04	.05	.06	100.00	28.85	10.80	.13
13 ADJUSTMENT : OUTSIDE INTEREST (12 X 4)	4944	2374	0	0	0	0	790	79	0	0
14 TOTAL ADJUSTMENT	-18106	-10487	-3684	-3648	-2217	-3206	-5062	-2622	-1162	1560
15 AVAILB. FOR EQUITY:1-2-3-4	7178	9230	7411	5084	4469	2775	-2389	6217	9639	8647
16 ADJUSTED DIVIDEND COVER	.97	1.48	1.55	1.23	1.40	.96	-.85	2.10	2.72	3.28
17 ADJ. COVER (DEF. TAX)	1.62	1.77	2.60	2.21	1.88	1.31	-2.56	3.22	3.55	3.42
18 EX ASSOCIATED CO EARNINGS	.96	1.42	.82	.58	.97	1.07	-.85	2.10	2.69	3.23

Appendix A.5

Example of CRUDE models computer printout

FINANCIAL RESULTS USING SIMPLIFIED INFLATION ADJUSTMENTS - V1C/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM A   25/08/92   15:44:00

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 TOTAL ASSETS (B/S)	393698	311064	172807	141063	136686	136265	140148	150557	101822	74147
2 FIXED ASSETS	149677	127142	60619	57765	54926	55562	59609	59732	47036	33431
3 REVALUED FIXED ASSETS	310849	254800	113192	105300	94872	99312	115919	105211	84919	58563
4 SHAREHOLDERS INTEREST	122862	110905	99164	89405	77841	73990	45677	45899	40364	31024
5 CONVERTIBLE LONGTERM LOANS	0	0	0	0	0	0	0	0	0	0
6 OUTSIDE INTEREST	43583	39823	39	40	42	42	9306	8902	44	41
7 CONVERTIBLE PREFS	0	0	0	0	0	0	0	0	0	0
8 DEFERRED TAXATION	0	0	0	0	0	0	0	0	0	0
9 EQUITY TO BE MAINTAINED	166445	150728	99203	89445	77883	74032	54983	54801	40408	31065
10 TOTAL OUTSIDE CAPITAL	227253	160336	73604	51618	58803	62233	85165	95756	61414	43082
11 ADJUSTED EQUITY (1-2+3-10)	327617	278386	151776	136980	117829	117782	111293	100280	78291	56197
12 ACCUMULATED DEPRECIATION	77241	67672	22228	18922	15916	16028	30594	21232	16440	13427
13 CURRENT DEPRECIATION	11836	9568	4987	4285	3853	3457	5539	5028	3228	2465
14 FACTOR (12/13)	5.0000	5.0000	4.4572	4.4159	4.1308	4.6364	5.0000	4.2228	5.0000	5.0000
15 PURCHASE DATE (B/S DATE-14)	84/06	83/06	83/01	82/01	81/04	79/10	78/06	78/03	76/06	75/06
16 INDEX ON B/S DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
17 INDEX ON PURCHASE DATE	85.6	76.6	73.2	63.9	57.7	47.9	39.4	38.7	32.6	29.3
18 FACTOR (16/17 -1.0)	1.0768	1.0041	.8673	.8229	.7273	.7874	.9447	.7614	.8054	.7518
19 ADDITIONAL DEPRECIATION	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
20 ADD. DEPR. WRITTEN OFF	0	0	0	0	0	0	0	0	0	0
21 DEFECIT ON ADD. DEPR.	12745	9606	4325	3526	2802	2722	5232	3828	2599	1853
22 EQUITY ADJUSTMENT	47588	26731	24899	21577	19372	13347	13042	14355	9800	7127
23 INCREASE IN VALUE OF NMA	44419	22868	18840	16950	15965	12540	13631	15284	10456	7669
24 INDEX ON B/S DATE	177.7	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3
25 INDEX AT MIDDLE OF FIN YEAR	164.2	145.9	127.2	107.7	90.9	80.3	72.3	63.6	55.8	48.2
26 INDEX AT START OF FIN YEAR	153.6	136.6	116.5	99.6	85.6	76.6	68.2	58.8	51.3	44.8
27 CHANGE IN INDEX OVER YEAR	15.7	12.4	17.2	16.9	16.4	11.7	12.3	16.1	14.6	14.6

FINANCIAL RESULTS USING SIMPLIFIED INFLATION ADJUSTMENTS - V1C/12-91

SECTOR 15 : INDUST. BEHEER - HOLDING   COMPANY 03453 : CULLINAN HOLDINGS

FORM B   25/08/92   15:44:00

	89/06	88/06	87/06	86/06	85/06	84/06	83/06	82/06	81/06	80/06
1 INCOME AFTER TAXATION	27962	21990	7672	6075	5364	6346	2728	9087	10756	7007
2 EARNINGS ASSOC COMPANIES	69	386	3477	2710	1377	-310	0	4	105	135
3 OUTSIDE INTEREST	-7636	-4978	1	2	0	0	-790	-276	-5	0
4 PREFERRED DIVIDENDS	-55	-55	-55	-55	-55	-55	-55	-55	-55	-55
5 AVAILABLE FOR EQUITY (HIS)	20340	17343	11095	8732	6686	5981	1883	8760	10801	7087
6 ORDINARY DIVIDENDS	7406	6247	4787	4119	3202	2896	2818	2958	3549	2638
7 HISTORICAL DVIDEND COVER	2.7464	2.7762	2.3177	2.1199	2.0881	2.0653	.6682	2.9615	3.0434	2.6865
ADJUSTMENT NO 1: PP-ADJUSTMENT ON EQUITY - MODEL CRUDE/1										
8 INFLATION ADJUSTMENT (1)	24907	15531	16267	14169	12490	7517	6767	7653	5208	3844
9 ADJUSTED INCOME (1)	-4567	1812	-5172	-5437	-5804	-1536	-4884	1107	5593	3243
10 OUTSIDE INTEREST ADJ.(1)	6801	3515	6	6	6	4	790	232	2	5
11 AVAILABLE FOR EQUITY (1)	2234	5327	-5166	-5431	-5798	-1532	-4094	1339	5595	3248
12 ADJUSTED DIVIDEND COVER (1)	.3016	.8527	-1.0792	-1.3185	-1.8107	-.5290	-1.4528	.4527	1.5765	1.2312
ADJUSTMENT NO 2: PP-ADJUSTMENT ON EQUITY MINUS VALUE INCREASE IN NON-MONETARY ASSETS - MODEL CRUDE/2										
13 INFLATION ADJUSTMENT (2)	3169	3863	6059	4627	3407	807	0	0	0	0
14 ADJUSTED INCOME (2)	17171	13480	5036	4105	3279	5174	1883	8760	10801	7087
15 OUTSIDE INTEREST ADJ.(2)	865	874	2	2	1	0	0	0	0	0
16 AVAILABLE FOR EQUITY (2)	18036	14354	5038	4107	3280	5174	1883	8760	10801	7087
17 ADJUSTED DIVIDEND COVER (2)	2.4353	2.2977	1.0524	.9971	1.0244	1.7866	.6682	2.9615	3.0434	2.6865

Appendix B

The inflation adjustments for the industrial sectors, expressed as a percentage of total assets, for the years 1989 to 1982.

Table B.1: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1989

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	5,58	4,50	3,81	3,80	6,10	2,45
Beverages, Hotels & Leisure	5,06	4,25	4,39	4,44	7,17	1,25
Building & Construction	5,18	4,54	2,76	2,96	5,85	1,68
Chemicals & Oils	4,91	4,45	3,67	3,87	5,47	1,36
Clothing, Footwear & Textiles	13,41	12,92	16,44	15,22	6,24	3,15
Food	7,13	6,28	6,17	6,21	7,36	3,06
Fishing	11,40	10,09	7,90	10,49	6,39	3,33
Furniture & Household Goods	7,29	6,64	7,71	6,87	5,60	3,74
Engineering	8,27	7,83	9,82	9,21	5,41	1,88
Electronics, Electrical & Battery	6,49	5,89	5,84	5,86	6,04	3,51
Motor	6,91	6,40	8,37	8,32	5,79	2,87
Paper & Packaging	8,99	8,54	9,82	9,64	6,31	2,23
Pharmaceutical & Medical	10,03	8,61	9,37	8,96	6,10	2,76
Printing & Publishing	9,83	8,50	7,67	8,47	6,82	3,04
Steel & Allied	3,40	2,58	2,19	2,81	5,53	0,56
Transportation	5,99	5,27	4,68	4,87	5,94	0,90
Retailers & Wholesalers	6,14	5,42	5,66	5,74	5,09	2,91
Sugar	8,14	6,67	6,03	6,37	9,52	2,52
Development Capital	9,22	9,00	11,52	10,75	5,68	3,18
Tobacco & Match	10,06	5,98	6,12	6,28	9,42	5,76
TOTAL	**7,57**	**6,84**	**7,44**	**7,25**	**6,02**	**2,63**

Table B.2: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1988

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	5,20	4,08	3,32	3,55	5,24	2,40
Beverages, Hotels & Leisure	3,35	2,69	1,20	1,88	6,03	1,11
Building & Construction	4,79	4,28	3,22	3,15	4,62	0,77
Chemicals & Oils	4,35	3,84	3,35	3,29	4,69	0,67
Clothing, Footwear & Textiles	22,82	22,12	27,61	26,87	5,34	2,46
Food	8,12	7,36	7,54	7,53	5,44	1,99
Fishing	12,92	11,73	9,83	12,00	5,38	3,11
Furniture & Household Goods	5,80	4,95	5,73	5,08	3,94	2,67
Engineering	10,68	9,72	12,84	12,61	5,13	2,31
Electronics, Electrical & Battery	6,27	5,78	5,27	5,76	5,79	3,51
Motor	7,44	6,13	10,48	10,37	5,52	2,47
Paper & Packaging	9,44	8,75	10,03	10,00	5,36	2,15
Pharmaceutical & Medical	15,11	13,96	13,82	14,77	6,28	3,89
Printing & Publishing	8,49	7,21	6,16	7,21	5,42	2,91
Steel & Allied	5,89	4,18	4,53	4,85	6,56	1,56
Transportation	4,01	3,38	2,57	2,90	5,45	0,96
Retailers & Wholesalers	6,24	5,70	6,25	6,09	4,49	2,66
Sugar	8,04	6,68	5,84	6,23	9,37	2,38
Development Capital	7,48	7,09	10,45	8,78	4,40	1,33
Tobacco & Match	9,23	4,77	4,73	5,23	8,41	6,36
TOTAL	**8,32**	**7,48**	**8,37**	**8,36**	**5,24**	**2,33**

Table B.3: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1987

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	5,88	4,71	3,67	3,62	7,34	2,75
Beverages, Hotels & Leisure	8,53	7,08	10,76	10,42	8,32	1,26
Building & Construction	5,62	4,99	3,20	3,46	6,52	0,99
Chemicals & Oils	5,72	4,94	3,17	3,99	6,27	1,62
Clothing, Footwear & Textiles	20,28	19,59	25,45	24,23	6,73	3,18
Food	7,73	6,63	6,04	6,19	7,81	2,26
Fishing	11,56	10,21	7,79	10,21	6,93	4,15
Furniture & Household Goods	7,61	6,78	8,69	7,71	4,99	2,96
Engineering	8,97	7,93	8,76	8,85	6,93	3,03
Electronics, Electrical & Battery	8,98	7,98	6,98	7,87	8,51	4,50
Motor	6,88	5,95	6,75	6,21	7,59	2,97
Paper & Packaging	7,13	6,41	6,05	6,18	6,78	2,03
Pharmaceutical & Medical	11,68	10,27	10,91	10,70	8,57	6,48
Printing & Publishing	8,14	6,82	7,72	6,66	7,75	2,98
Steel & Allied	5,29	4,06	2,80	3,12	7,79	1,43
Transportation	3,58	2,72	1,41	1,94	7,88	1,36
Retailers & Wholesalers	6,01	5,62	5,60	5,46	5,69	3,02
Sugar	6,17	4,73	3,37	3,67	11,41	2,66
Development Capital	11,32	11,32	14,90	14,82	5,21	1,77
Tobacco & Match	10,35	5,03	4,26	4,95	10,75	8,16
TOTAL	**8,23**	**7,27**	**7,61**	**7,53**	**7,08**	**2,80**

Table B.4: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1986

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	5,74	4,75	4,41	3,67	7,44	2,31
Beverages, Hotels & Leisure	3,77	3,08	2,26	2,08	8,40	1,51
Building & Construction	5,54	4,97	2,56	2,85	7,00	0,87
Chemicals & Oils	9,76	9,05	7,08	7,07	7,60	2,02
Clothing, Footwear & Textiles	16,09	15,59	19,75	18,16	8,09	3,36
Food	7,69	6,60	5,63	5,77	9,05	2,32
Fishing	12,25	9,58	5,83	9,59	9,50	6,08
Furniture & Household Goods	7,94	7,28	9,20	8,23	5,49	3,66
Engineering	8,03	6,80	7,07	6,75	8,06	3,09
Electronics, Electrical & Battery	7,82	7,56	7,33	7,31	8,85	3,70
Motor	7,53	6,56	7,51	6,25	8,93	3,36
Paper & Packaging	9,34	8,51	8,22	8,16	9,05	2,11
Pharmaceutical & Medical	11,86	10,03	11,08	10,35	9,53	6,41
Printing & Publishing	7,41	6,80	6,73	6,57	8,44	2,09
Steel & Allied	5,11	4,55	2,79	2,85	8,96	1,35
Transportation	4,07	2,84	1,74	1,90	9,89	1,65
Retailers & Wholesalers	6,11	5,56	5,56	5,15	6,46	2,90
Sugar	6,39	4,68	3,37	3,43	12,24	2,81
Development Capital	7,34	7,34	5,50	8,49	6,40	0,00
Tobacco & Match	9,90	6,47	5,28	6,19	11,05	7,01
TOTAL	**7,73**	**6,84**	**6,82**	**6,41**	**7,93**	**2,73**

Table B.5: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1985

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	5,84	4,96	4,86	4,35	7,00	2,25
Beverages, Hotels & Leisure	3,12	2,79	2,04	1,42	7,87	0,76
Building & Construction	5,20	4,64	2,05	2,55	6,52	1,09
Chemicals & Oils	8,08	7,41	7,58	7,71	7,37	1,94
Clothing, Footwear & Textiles	15,07	14,26	17,30	16,44	7,95	3,83
Food	6,73	5,75	4,84	4,76	7,89	1,93
Fishing	11,76	8,96	4,44	8,96	8,29	6,08
Furniture & Household Goods	8,39	7,80	8,62	7,97	5,26	3,75
Engineering	7,64	6,57	7,49	7,09	6,95	2,44
Electronics, Electrical & Battery	6,83	6,61	6,33	6,31	7,96	3,28
Motor	9,34	8,32	11,45	10,18	8,68	2,53
Paper & Packaging	7,75	7,47	7,56	7,38	7,03	1,48
Pharmaceutical & Medical	9,55	8,06	8,43	7,96	9,02	5,96
Printing & Publishing	5,94	5,56	5,35	5,18	7,51	1,44
Steel & Allied	3,61	3,43	2,18	2,01	7,42	1,03
Transportation	4,04	2,91	1,31	1,83	9,40	1,51
Retailers & Wholesalers	6,55	5,90	6,65	6,22	6,55	3,42
Sugar	5,71	4,09	3,09	3,07	9,79	2,29
Tobacco & Match	10,27	6,74	5,56	6,98	9,94	6,73
TOTAL	**7,66**	**6,86**	**7,26**	**6,90**	**7,30**	**2,61**

Table B.6: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1984

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	4,39	3,79	4,67	4,14	4,37	1,38
Beverages, Hotels & Leisure	2,60	2,36	1,91	1,36	5,51	0,71
Building & Construction	4,62	4,27	2,51	3,13	4,56	0,75
Chemicals & Oils	4,52	3,95	3,21	3,36	5,10	1,38
Clothing, Footwear & Textiles	10,72	10,31	11,09	11,02	6,34	3,76
Food	4,11	3,51	3,10	2,90	5,20	1,08
Fishing	5,66	3,50	1,48	3,21	5,99	3,67
Furniture & Household Goods	5,62	5,17	5,58	5,27	3,87	2,55
Engineering	5,59	4,79	4,82	4,76	5,23	1,94
Electronics, Electrical & Battery	5,20	5,02	4,98	4,90	5,81	2,62
Motor	4,87	4,37	4,06	4,16	5,11	1,80
Paper & Packaging	5,32	5,15	4,70	4,69	5,39	1,27
Pharmaceutical & Medical	8,80	7,77	7,77	7,80	6,87	4,72
Printing & Publishing	5,87	5,13	5,43	5,15	6,05	1,75
Steel & Allied	3,52	3,33	2,37	2,32	5,30	0,89
Transportation	3,24	2,70	1,23	1,77	4,81	0,79
Retailers & Wholesalers	4,52	4,12	4,69	4,61	3,87	1,81
Sugar	5,02	3,69	3,22	3,13	7,09	1,60
Tobacco & Match	7,44	5,70	4,86	5,85	7,24	4,23
TOTAL	**5,43**	**4,87**	**4,88**	**4,81**	**5,07**	**1,89**

Table B.7: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1983

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	5,12	4,43	4,67	3,89	5,23	1,95
Beverages, Hotels & Leisure	2,13	1,80	1,33	1,03	5,23	1,14
Building & Construction	4,75	4,39	3,14	3,50	5,05	0,78
Chemicals & Oils	4,20	3,64	3,38	3,46	5,58	1,92
Clothing, Footwear & Textiles	9,08	8,65	9,02	9,08	6,66	4,10
Food	3,66	3,24	2,90	2,65	5,12	0,87
Fishing	5,96	3,38	1,10	2,89	6,61	4,13
Furniture & Household Goods	5,16	4,71	5,04	4,74	4,20	2,97
Engineering	5,24	4,44	4,30	4,16	5,66	2,29
Electronics, Electrical & Battery	5,87	5,59	5,71	5,39	6,62	2,75
Motor	4,36	3,24	2,48	2,54	6,17	2,69
Paper & Packaging	4,06	3,87	3,52	3,56	5,14	1,53
Pharmaceutical & Medical	5,68	4,22	3,93	3,82	6,07	4,05
Printing & Publishing	6,38	5,76	5,43	5,50	6,48	1,74
Steel & Allied	4,98	4,62	4,13	3,95	6,22	1,11
Transportation	4,24	3,70	2,18	2,66	5,31	1,05
Retailers & Wholesalers	5,39	4,18	4,70	4,46	5,31	3,01
Sugar	5,99	4,14	3,69	3,51	9,38	2,53
Tobacco & Match	5,08	2,93	1,71	2,81	7,47	4,75
TOTAL	**5,26**	**4,55**	**4,41**	**4,24**	**5,64**	**2,34**

Table B.8: Adjustment to income as a percentage of total assets: sector average inflation adjustment for 1982

SECTOR	AC201/1	AC201/2	NEUTRL/1	NEUTRL/2	CRUDE/1	CRUDE/2
Industrial Holding	4,41	3,74	3,25	2,73	5,75	2,11
Beverages, Hotels & Leisure	0,95	0,59	-0,27	-0,71	5,29	0,82
Building & Construction	4,38	4,06	2,69	2,96	6,60	1,45
Chemicals & Oils	4,13	3,39	2,92	2,81	6,99	2,54
Clothing, Footwear & Textiles	8,37	7,89	8,18	8,00	7,86	4,85
Food	4,49	4,04	3,68	3,47	6,36	1,39
Fishing	5,46	2,86	0,94	2,23	7,19	4,76
Furniture & Household Goods	5,11	4,68	4,97	4,54	4,83	3,37
Engineering	4,67	3,75	3,68	3,29	5,99	2,59
Electronics, Electrical & Battery	5,77	5,34	5,16	5,17	7,15	3,29
Motor	4,06	3,16	2,31	2,37	6,25	2,79
Paper & Packaging	3,80	3,50	3,17	3,13	6,85	2,19
Pharmaceutical & Medical	8,50	6,66	6,53	6,36	8,53	5,66
Printing & Publishing	6,34	5,72	5,20	5,40	7,65	2,17
Steel & Allied	3,38	3,00	2,80	2,34	6,25	0,75
Transportation	3,39	2,99	0,90	1,40	6,22	1,08
Retailers & Wholesalers	4,44	2,95	2,85	2,55	5,91	3,51
Sugar	4,79	2,79	1,58	1,69	10,09	2,58
Tobacco & Match	4,97	0,62	-0,85	0,43	9,26	7,33
TOTAL	**4,84**	**4,04**	**3,62**	**3,44**	**6,45**	**2,77**

Appendix C

The number of industrial companies with real dividend covers of greater than one, less than one and zero per sector and inflation accounting model, for the years 1982 to 1989.

Table C.1: Real dividend covers for 1989 based on Model:

1989			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	3	35	27	8	29	6	29	6	28	7	27	8	33	2
Beverages, Hotels & Leisure	0	9	4	5	4	5	6	3	5	4	2	7	7	2
Building & Construction	2	20	11	9	14	6	15	5	15	5	12	8	19	1
Chemicals & Oils	0	9	4	5	4	5	8	1	7	2	6	3	9	0
Clothing, Footwear & Textiles	2	27	9	18	10	17	10	17	10	17	18	9	24	3
Food	0	16	7	9	9	7	8	8	9	7	7	9	11	5
Fishing	0	1	0	1	0	1	0	1	0	1	1	0	1	0
Furniture & Household Goods	2	10	3	7	5	5	5	5	5	5	5	5	9	1
Engineering	5	26	9	17	11	15	13	13	12	14	14	12	24	2
Electronics, Electrical & Battery	3	29	20	9	20	9	19	10	20	9	21	8	27	2
Motor	1	11	6	5	7	4	6	5	6	5	7	4	11	0
Paper & Packaging	3	13	6	7	6	7	6	7	6	7	8	5	12	1
Pharmaceutical & Medical	1	9	5	4	5	4	5	4	6	3	6	3	8	1
Printing & Publishing	1	7	3	4	4	3	5	2	4	3	5	2	7	0
Steel & Allied	0	2	1	1	1	1	1	1	1	1	1	1	2	0
Transportation	0	8	6	2	6	2	6	2	6	2	5	3	7	1
Retailers & Wholesalers	0	35	19	16	21	14	21	14	21	14	24	11	32	3
Sugar	0	3	2	1	2	1	2	1	2	1	1	2	2	1
Development Capital	8	9	6	3	6	3	6	3	6	3	6	3	9	0
Tobacco & Match	0	3	0	3	1	2	1	2	1	2	0	3	2	1
TOTAL	**31**	**282**	**148**	**134**	**165**	**117**	**172**	**110**	**170**	**112**	**176**	**106**	**256**	**26**

Table C.2: Real dividend covers for 1988 based on Model:

1988			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	2	37	23	14	29	8	29	8	29	8	25	12	35	2
Beverages, Hotels & Leisure	0	9	6	3	6	3	8	1	7	2	2	7	7	2
Building & Construction	2	14	7	7	7	7	11	3	10	4	9	5	11	3
Chemicals & Oils	0	6	3	3	3	3	3	3	4	2	3	3	6	0
Clothing, Footwear & Textiles	3	17	4	13	6	11	4	13	4	13	14	3	15	2
Food	1	12	4	8	6	6	6	6	6	6	5	7	11	1
Fishing	0	1	0	1	0	1	0	1	0	1	0	1	0	1
Furniture & Household Goods	0	10	5	5	6	4	4	6	4	6	6	4	9	1
Engineering	6	21	3	18	5	16	4	17	4	17	10	11	18	3
Electronics, Electrical & Battery	1	19	14	5	14	5	14	5	15	4	15	4	17	2
Motor	1	9	4	5	4	5	4	5	4	5	7	2	8	1
Paper & Packaging	0	13	6	7	6	7	5	8	5	8	11	2	11	2
Pharmaceutical & Medical	1	6	2	4	2	4	2	4	2	4	4	2	5	1
Printing & Publishing	0	5	3	2	3	2	3	2	3	2	5	0	5	0
Steel & Allied	0	3	2	1	2	1	2	1	2	1	2	1	3	0
Transportation	0	4	3	1	3	1	3	1	3	1	3	1	3	1
Retailers & Wholesalers	1	31	18	13	22	9	20	11	22	9	25	6	29	2
Sugar	0	3	1	2	1	2	2	1	1	2	0	3	2	1
Development Capital	6	1	0	1	0	1	0	1	0	1	0	1	1	0
Tobacco & Match	0	2	1	1	1	1	1	1	1	1	0	2	2	0
TOTAL	**24**	**223**	**109**	**114**	**126**	**97**	**125**	**98**	**126**	**97**	**146**	**77**	**198**	**25**

Table C.3: Real dividend covers for 1987 based on Model:

1987			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	1	36	14	22	23	13	28	8	26	10	8	28	30	6
Beverages, Hotels & Leisure	1	6	3	3	4	2	5	1	5	1	1	5	6	0
Building & Construction	3	10	2	8	2	8	4	6	5	5	0	10	7	3
Chemicals & Oils	2	5	2	3	3	2	3	2	3	2	2	3	5	0
Clothing, Footwear & Textiles	1	15	2	13	2	13	1	14	2	13	7	8	13	2
Food	0	9	0	9	1	8	3	6	1	8	1	8	7	2
Fishing	0	1	0	1	0	1	0	1	0	1	1	0	1	0
Furniture & Household Goods	1	8	2	6	2	6	3	5	3	5	3	5	6	2
Engineering	3	22	3	19	3	19	7	15	6	16	2	20	16	6
Electronics, Electrical & Battery	0	11	3	8	4	7	4	7	4	7	4	7	8	3
Motor	2	7	2	5	3	4	4	3	3	4	1	6	5	2
Paper & Packaging	1	11	4	7	4	7	4	7	4	7	3	8	10	1
Pharmaceutical & Medical	0	5	2	3	2	3	2	3	2	3	2	3	4	1
Printing & Publishing	0	4	1	3	1	3	2	2	2	2	2	2	4	0
Steel & Allied	1	2	1	1	1	1	1	1	1	1	0	2	1	1
Transportation	0	3	2	1	2	1	2	1	2	1	2	1	2	1
Retailers & Wholesalers	2	20	6	14	7	13	10	10	9	11	7	13	13	7
Sugar	0	3	1	2	2	1	3	0	3	0	1	2	2	1
Development Capital	1	1	0	1	0	1	0	1	0	1	1	0	1	0
Tobacco & Match	0	2	0	2	1	1	1	1	1	1	0	2	1	1
TOTAL	**19**	**181**	**50**	**131**	**67**	**114**	**87**	**94**	**82**	**99**	**48**	**133**	**142**	**39**

Table C.4: Real dividend covers for 1986 based on Model:

1986			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	DC=0	DC≠0	DC>1	DC<1	DC>1	DC<1	DC>1	DC<1	DC>1	DC<1	DC>1	DC<1	DC>1	DC<1
Industrial Holding	9	30	5	25	6	24	12	18	15	15	2	28	20	10
Beverages, Hotels & Leisure	1	6	2	4	4	2	5	1	5	1	0	6	5	1
Building & Construction	5	9	0	9	0	9	2	7	3	6	0	9	5	4
Chemicals & Oils	3	5	2	3	2	3	3	2	2	3	2	3	4	1
Clothing, Footwear & Textiles	2	12	0	12	0	12	0	12	0	12	0	12	6	6
Food	2	8	1	7	1	7	3	5	2	6	1	7	7	1
Fishing	0	1	0	1	0	1	1	0	0	1	0	1	1	0
Furniture & Household Goods	6	5	0	5	0	5	0	5	0	5	1	4	1	4
Engineering	5	19	2	17	3	16	6	13	5	14	1	18	14	5
Electronics, Electrical & Battery	2	9	2	7	2	7	2	7	2	7	1	8	6	3
Motor	3	7	0	7	0	7	0	7	1	6	0	7	2	5
Paper & Packaging	1	10	0	10	0	10	1	9	1	9	0	10	8	2
Pharmaceutical & Medical	0	4	0	4	1	3	0	4	1	3	0	4	2	2
Printing & Publishing	1	2	0	2	0	2	0	2	1	1	0	2	2	0
Steel & Allied	1	2	1	1	1	1	1	1	1	1	0	2	1	1
Transportation	1	1	1	0	1	0	1	0	1	0	0	1	1	0
Retailers & Wholesalers	5	14	4	10	4	10	5	9	5	9	3	11	8	6
Sugar	0	3	0	3	0	3	0	3	0	3	0	3	2	1
Development Capital	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco & Match	0	3	0	3	1	2	1	2	1	2	0	3	2	1
TOTAL	**48**	**150**	**20**	**130**	**26**	**124**	**43**	**107**	**46**	**104**	**11**	**139**	**97**	**53**

Table C.5: Real dividend covers for 1985 based on Model:

1985			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	12	29	2	27	5	24	10	19	12	17	4	25	18	11
Beverages, Hotels & Leisure	1	4	4	0	4	0	4	0	4	0	0	4	4	0
Building & Construction	3	9	2	7	2	7	5	4	5	4	1	8	5	4
Chemicals & Oils	4	6	3	3	3	3	3	3	3	3	1	5	4	2
Clothing, Footwear & Textiles	7	13	0	13	1	12	1	12	1	12	3	10	4	9
Food	2	8	1	7	2	6	3	5	3	5	0	8	6	2
Fishing	0	1	0	1	0	1	1	0	0	1	0	1	1	0
Furniture & Household Goods	6	5	0	5	0	5	0	5	0	5	1	4	1	4
Engineering	9	16	2	14	2	14	3	13	3	13	1	15	8	8
Electronics, Electrical & Battery	2	8	2	6	2	6	2	6	2	6	3	5	6	2
Motor	5	7	0	7	0	7	1	6	1	6	1	6	2	5
Paper & Packaging	2	10	0	10	0	10	1	9	1	9	1	9	8	2
Pharmaceutical & Medical	0	4	1	3	1	3	1	3	1	3	0	4	1	3
Printing & Publishing	1	2	0	2	0	2	1	1	1	1	0	2	2	0
Steel & Allied	1	2	1	1	1	1	1	1	1	1	0	2	2	0
Transportation	0	2	0	2	1	1	1	1	1	1	0	2	1	1
Retailers & Wholesalers	4	16	5	11	5	11	6	10	6	10	3	13	7	9
Sugar	0	3	0	3	1	2	2	1	2	1	0	3	2	1
Development Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco & Match	0	2	0	2	1	1	1	1	1	1	0	2	0	2
TOTAL	**59**	**147**	**23**	**124**	**31**	**116**	**47**	**100**	**48**	**99**	**19**	**128**	**82**	**65**

Table C.6: Real dividend covers for 1984 based on Model:

1984			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	11	33	9	24	9	24	13	20	15	18	9	24	24	9
Beverages, Hotels & Leisure	1	4	4	0	4	0	4	0	4	0	2	2	4	0
Building & Construction	1	14	6	8	8	6	10	4	9	5	6	8	14	0
Chemicals & Oils	3	7	3	4	3	4	3	4	3	4	2	5	6	1
Clothing, Footwear & Textiles	3	17	0	17	0	17	0	17	0	17	3	14	7	10
Food	1	9	4	5	6	3	5	4	6	3	4	5	8	1
Fishing	0	3	1	2	1	2	2	1	1	2	1	2	1	2
Furniture & Household Goods	0	9	4	5	4	5	4	5	4	5	5	4	7	2
Engineering	5	20	2	18	2	18	5	15	4	16	3	17	15	5
Electronics, Electrical & Battery	1	8	4	4	4	4	4	4	5	3	5	3	7	1
Motor	4	9	4	5	5	4	5	4	5	4	4	5	8	1
Paper & Packaging	1	8	3	5	4	4	4	4	4	4	2	6	7	1
Pharmaceutical & Medical	0	4	1	3	1	3	1	3	1	3	1	3	2	2
Printing & Publishing	1	2	0	2	0	2	0	2	0	2	0	2	1	1
Steel & Allied	0	3	3	0	3	0	3	0	3	0	2	1	3	0
Transportation	0	3	3	0	3	0	3	0	3	0	2	1	3	0
Retailers & Wholesalers	1	15	5	10	5	10	5	10	5	10	6	9	11	4
Sugar	0	3	1	2	1	2	1	2	1	2	0	3	1	2
Development Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco & Match	0	3	1	2	1	2	1	2	1	2	1	2	3	0
TOTAL	**33**	**174**	**58**	**116**	**64**	**110**	**73**	**101**	**74**	**100**	**58**	**116**	**132**	**42**

Table C.7: Real dividend covers for 1983 based on Model:

1983			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	9	35	8	27	11	24	13	22	13	22	10	25	23	12
Beverages, Hotels & Leisure	3	4	4	0	4	0	4	0	4	0	1	3	4	0
Building & Construction	1	14	6	8	6	8	10	4	10	4	6	8	14	0
Chemicals & Oils	1	10	6	4	6	4	7	3	7	3	4	6	10	0
Clothing, Footwear & Textiles	2	18	2	16	2	16	2	16	2	16	3	15	12	6
Food	1	9	4	5	4	5	5	4	4	5	3	6	8	1
Fishing	0	3	0	3	2	1	2	1	2	1	0	3	2	1
Furniture & Household Goods	0	13	5	8	6	7	5	8	5	8	8	5	10	3
Engineering	5	22	8	14	10	12	12	10	12	10	5	17	16	6
Electronics, Electrical & Battery	1	11	3	8	3	8	3	8	4	7	2	9	6	5
Motor	4	11	5	6	5	6	7	4	8	3	5	6	8	3
Paper & Packaging	0	11	9	2	10	1	9	2	10	1	5	6	10	1
Pharmaceutical & Medical	0	5	2	3	2	3	2	3	2	3	1	4	3	2
Printing & Publishing	0	4	1	3	1	3	1	3	1	3	1	3	4	0
Steel & Allied	0	3	1	2	1	2	1	2	1	2	0	3	3	0
Transportation	0	3	0	3	1	2	3	0	2	1	1	2	3	0
Retailers & Wholesalers	3	18	9	9	10	8	10	8	10	8	8	10	11	7
Sugar	0	3	0	3	0	3	1	2	1	2	0	3	1	2
Development Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco & Match	0	3	3	0	3	0	3	0	3	0	0	3	3	0
TOTAL	**30**	**200**	**76**	**124**	**87**	**113**	**100**	**100**	**101**	**99**	**63**	**137**	**151**	**49**

Table C.8: Real dividend covers for 1982 based on Model:

1982			AC201/1		AC201/2		NEUTRL/1		NEUTRL/2		CRUDE/1		CRUDE/2	
SECTOR	**DC=0**	**DC≠0**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**	**DC>1**	**DC<1**
Industrial Holding	3	41	24	17	27	14	31	10	30	11	15	26	33	8
Beverages, Hotels & Leisure	2	5	4	1	4	1	4	1	4	1	1	4	5	0
Building & Construction	0	17	11	6	11	6	12	5	13	4	6	11	14	3
Chemicals & Oils	1	10	5	5	8	2	8	2	8	2	1	9	10	0
Clothing, Footwear & Textiles	2	18	5	13	6	12	5	13	7	11	6	12	12	6
Food	0	9	5	4	5	4	5	4	7	2	2	7	9	0
Fishing	0	3	0	3	1	2	3	0	1	2	0	3	1	2
Furniture & Household Goods	1	13	8	5	8	5	7	6	8	5	9	4	11	2
Engineering	4	23	12	11	16	7	15	8	17	6	7	16	16	7
Electronics, Electrical & Battery	0	10	5	5	6	4	6	4	6	4	3	7	8	2
Motor	1	16	10	6	12	4	12	4	12	4	8	8	12	4
Paper & Packaging	1	12	11	1	11	1	11	1	12	0	5	7	10	2
Pharmaceutical & Medical	0	5	2	3	2	3	3	2	3	2	0	5	3	2
Printing & Publishing	0	5	4	1	4	1	4	1	4	1	3	2	5	0
Steel & Allied	1	1	1	0	1	0	1	0	1	0	0	1	1	0
Transportation	0	3	3	0	3	0	3	0	3	0	1	2	3	0
Retailers & Wholesalers	1	19	10	9	11	8	11	8	11	8	7	12	11	8
Sugar	0	4	2	2	4	0	4	0	4	0	0	4	2	2
Development Capital	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tobacco & Match	0	3	3	0	3	0	3	0	3	0	1	2	1	2
TOTAL	**17**	**217**	**125**	**92**	**143**	**74**	**148**	**69**	**154**	**63**	**75**	**142**	**167**	**50**

Appendix D.1

Company statistics of the LIFO sample

The company names supplied are those that were in use in March 1984, and were extracted from the *Stock Exchange Handbook*. For ease of reference the word *The*, which sometimes forms part of a company's name, has been omitted.

Company statistics of the LIFO sample

Company	N	R^2	Beta	t-value
AECI	121	0,433	1,032	9,525[a]
African & Overseas Enterprises	77	0,000	-0,024	-0,103
African Cables	94	0,089	0,725	3,002[a]
Alex Lipworth	47	0,014	-0,124	-0,790
Anglo American Industrial Corporation	121	0,572	1,362	12,602[a]
Anglo-Alpha	121	0,291	0,843	6,995[a]
Anglo-Transvaal Industries	121	0,328	0,944	7,616[a]
Argus Printing and Publishing Company	107	0,221	0,647	5,456[a]
Aurochs Investment Company (S.A.)	103	0,079	0,917	2,946[a]
B. & S. Steel Furniture Company	86	0,029	0,555	1,584
Barlow Rand	121	0,612	1,142	13,700[a]
Beares	109	0,203	0,912	5,215[a]
Blaikie-Johnstone	86	0,102	0,822	3,094[a]
C.G. Smith Foods	94	0,293	0,911	6,172[a]
Cadbury Schweppes (South Africa)	117	0,137	0,535	4,264[a]
Cape Wine & Distillers	120	0,177	0,604	5,029[a]
Carlton Paper Corporation	102	0,162	0,554	4,402[a]
Clicks Stores	120	0,195	0,873	5,349[a]
CNA Gallo	119	0,299	1,391	7,071[a]
Coates Brothers (South Africa)	86	0,086	0,628	2,810[a]
Consol	108	0,087	0,281	3,172[a]
Cullinan Holdings	119	0,269	1,236	6,558[a]
Duros	91	0,047	0,419	2,094[a]
Edgars Stores	112	0,280	0,768	6,540[a]
Edward L. Bateman	115	0,191	0,885	5,170[a]
Elcentre Corporation	120	0,062	0,827	2,796[a]
Everite	113	0,234	0,661	5,825[a]

Foschini	98	0,195	0,671	4,829[a]
Frasers	119	0,199	1,071	5,387[a]
Garlick	108	0,156	0,501	4,422[a]
General Tire and Rubber Company (South Africa)	91	0,060	0,489	2,385[a]
Highveld Steel and Vanadium Corporation	121	0,146	0,759	4,505[a]
Hortors Trio-Rand	101	0,060	0,563	2,521[a]
Imperial Cold Storage and Supply Company	120	0,230	0,936	5,929[a]
Industrial Investment Company	43	0,013	0,141	0,723
Irvin & Johnson	121	0,294	0,955	7,031[a]
John Orr Holdings	120	0,112	0,797	3,864[a]
Kohler	120	0,169	0,698	4,894[a]
Landlock	115	0,095	1,019	3,451[a]
Lion Match Company	113	0,185	0,424	5,027[a]
Metair Investments	110	0,135	0,830	4,113[a]
Metal Box South Africa	121	0,235	1,013	6,053[a]
Metal Closures Group South Africa	80	0,047	0,271	1,977[a]
Metkor Group	120	0,211	1,035	5,626[a]
Nampak	120	0,413	0,873	9,116[a]
Natal Chemical Syndicate	52	0,002	0,069	0,327
National Bolts	86	0,008	0,186	0,804
National Trading Company	106	0,055	0,297	2,450[a]
Pepkor	118	0,209	1,005	5,543[a]
Plate Glass & Shatterprufe Industries	120	0,393	1,057	8,740[a]
Press Supplies Holdings	27	0,086	-0,174	-1,531
Pretoria Portland Cement Company	121	0,322	0,938	7,511[a]
Putco	121	0,055	0,478	2,640[a]
Rembrandt Controlling Investments	121	0,258	0,859	6,435[a]
Rembrandt Group	121	0,333	0,940	7,714[a]
Rex Trueform Clothing Company	86	0,214	0,559	4,778[a]

Romatex	121	0,122	0,567	4,067[a]
Sappi	121	0,285	0,930	6,891[a]
Sasol	121	0,312	0,756	7,341[a]
Scottish Cables	83	0,145	0,841	3,709[a]
Seardel Investment Corporation	120	0,301	1,265	7,125[a]
Searles Holdings	84	0,086	0,359	2,777[a]
South Atlantic Corporation	98	0,044	0,285	2,099[a]
Standard Brass Iron & Steel Foundries	110	0,020	0,207	1,503
Steelmetals	112	0,152	0,669	4,449[a]
Sterns Diamond Organisation	121	0,111	0,835	3,862[a]
Stewarts & Lloyds of South Africa	73	0,348	0,686	6,158[a]
Suncrush	116	0,177	0,619	4,945[a]
Technical and Industrial Investments	111	0,280	0,745	6,506[a]
Technical Investment Corporation	110	0,340	0,659	7,458[a]
Toyota South Africa	112	0,297	1,230	6,811[a]
Trek Beleggings	121	0,168	0,770	4,905[a]
Union Steel Corporation of South Africa	121	0,164	1,040	4,825[a]
Utico Holdings	116	0,198	0,722	5,306[a]
Vereeniging Refractories	106	0,131	0,566	3,951[a]
Welfit Oddy Holdings	88	0,077	0,431	2,681[a]
Wesco Investments	115	0,290	1,091	6,799[a]
Williams, Hunt South Africa	110	0,132	1,270	4,058[a]
Woolworths Truworths	121	0,474	1,162	10,354[a]

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

Appendix D.2

Company statistics of the flip-flop sample

The company names supplied are those that were in use in March 1984, and were extracted from the *Stock Exchange Handbook*. For ease of reference the word *The*, which sometimes forms part of a company's name, has been omitted.

Company statistics of the flip-flop sample

Company	N	R^2	Beta	t-value
Amalgamated Retail	118	0,254	1,025	6,280[a]
Associated Furniture Companies	118	0,371	1,195	8,276[a]
Boymans	71	0,144	0,851	3,401[a]
Chemical Services	117	0,339	0,911	7,681[a]
Dorbyl	120	0,365	0,989	8,235[a]
Gresham Industries	110	0,022	0,530	1,548
Haggie	113	0,230	0,595	5,754[a]
Hunt Leuchars and Hepburn Holdings	121	0,114	0,640	3,904[a]
Kimet	119	0,162	1,319	4,762[a]
Kirsh Trading Group	121	0,088	0,985	3,381[a]
LTA	120	0,163	0,795	4,786[a]
Lucem Holdings	119	0,179	1,581	5,054[a]
Malbak	119	0,298	1,093	7,050[a]
Messina	121	0,173	1,169	4,994[a]
Metro Corporation	110	0,161	1,016	4,555[a]
O.K. Bazaars (1929)	121	0,408	1,104	9,062[a]
Premier Group Holdings	121	0,329	1,075	7,636[a]
Protea Holdings	121	0,231	1,219	5,974[a]
Rennies Consolidated Holdings	73	0,222	1,239	4,505[a]
South African Breweries	121	0,528	1,166	11,544[a]
Tiger Oats and National Milling Company	120	0,224	0,809	5,828[a]
Tongaat-Hulett Group	121	0,486	1,139	10,605[a]
Trencor	57	0,075	0,367	2,115[a]
Unisec Group	102	0,197	0,687	4,961[a]

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

Appendix D.3

Company statistics of the control sample

The company names supplied are those that were in use in March 1984, and were extracted from the *Stock Exchange Handbook*. For ease of reference the word *The*, which sometimes forms part of a company's name, has been omitted.

Company statistics of the control sample

Company	N	R^2	Beta	t-value
Abercom Group	121	0,194	1,045	5,357[a]
Aberdare Cables Africa	103	0,104	0,427	3,424[a]
Adcock Ingram	64	0,303	0,529	5,187[a]
Adonis Knitwear Holdings	115	0,082	0,604	3,168[a]
African Oxygen	120	0,346	1,057	7,899[a]
Afrikaanse Pers (1982)	119	0,147	0,688	4,491[a]
Allied Electronics Corporation	116	0,307	1,105	7,113[a]
Allied Technologies	119	0,437	1,196	9,521[a]
Amalgamated Industrial Investment Corporation	38	0,065	0,571	1,577
Anchusa Holdings	118	0,162	0,870	4,739[a]
Asea Electric South Africa	107	0,031	0,362	1,818[b]
Associated Engineering (SA)	116	0,111	1,178	3,767[a]
Barbican Industrial Holdings	121	0,118	1,301	3,985[a]
Berkshire International (SA)	92	0,097	0,562	3,108[a]
Berzack Brothers (Holdings)	59	0,079	0,340	2,205[a]
Berzack-Illman Investment Corporation	13	0,119	0,509	3,875[a]
Blue Circle	121	0,254	0,928	6,370[a]
Bonuskor	120	0,186	0,932	5,192[a]
Boumat	119	0,278	0,904	6,708[a]
Bradlows Stores	47	0,059	-0,369	-1,684[b]
Brian Porter Holdings	103	0,022	0,320	1,493
Buffalo Corporation	117	0,039	0,547	2,173[a]
Burlington Industries	10	0,000	0,008	0,041
C.G. Smith	121	0,489	1,076	10,672[a]
Caxton	21	0,009	0,261	0,411
Cementation Company (Africa)	119	0,122	0,681	4,033[a]

Chubb Holdings	115	0,207	0,997	5,435[a]
Claude Neon Lights (S.A.)	120	0,296	1,015	7,043[a]
Concor	120	0,180	1,152	5,093[a]
Consolidated Textile Mills Investment Corporation	88	0,009	0,292	0,893
Crookes Brothers	59	0,005	-0,091	-0,521
Currie Finance Corporation	121	0,247	0,837	6,253[a]
Currie Motors (1946)	99	0,224	0,676	5,286[a]
Darling & Hodgson	118	0,085	0,544	3,292[a]
Davgra Investments	120	0,061	0,852	2,760[a]
Dekro	114	0,016	0,337	1,347
Delswa	73	0,082	0,570	2,522[a]
Diroyal Investments	118	0,090	0,654	3,386[a]
Dundee Industries	109	0,038	0,557	2,067[a]
Dunlop South Africa	120	0,305	0,893	7,192[a]
Ellerine Holdings	105	0,091	0,508	3,216[a]
Ensign Clothing	90	0,015	0,297	1,166
Eureka Industrial	109	0,002	0,152	0,462
Farm-Ag	121	0,101	0,785	3,661[a]
Federale Volksbeleggings	121	0,235	1,058	6,040[a]
Fedfood	120	0,455	1,228	9,929[a]
Field Industries Africa	119	0,041	0,512	2,245[a]
Fintec	102	0,083	0,717	3,015[a]
Fralex	120	0,134	0,983	4,278[a]
Fraser Alexander	110	0,125	0,612	3,935[a]
Frasers Consolidated	117	0,130	0,905	4,142[a]
Frencorp	87	0,040	0,365	1,871[b]
General Erection Holdings	101	0,013	0,235	1,133
General Optical Company	45	0,003	0,092	0,346
Globe Engineering Works	109	0,058	0,319	2,557[a]

Goldfields Industrial Coporation	117	0,144	1,273	4,403*
Goodhope Concrete Pipes	83	0,010	0,346	0,901
Grinaker Holdings	119	0,254	1,307	6,305*
Group Five Engineering	118	0,173	1,065	4,918*
Gubb & Inggs	88	0,028	0,177	1,570
Gypsum Industries	88	0,069	0,307	2,527*
H & J Supreme Cables & Electronics	119	0,044	0,568	2,324*
IFM Group	120	0,134	0,991	4,281*
Industrial and Commercial Holdings Group	72	0,076	0,445	2,403*
Jabula Foods	85	0,005	0,097	0,651
Jaff-Delswa Investments	72	0,056	0,453	2,047*
Kanhym Investments	121	0,170	1,088	4,931*
L.H. Marthinusen	117	0,108	0,830	3,733*
Lewis Foschini Investment Company	104	0,105	0,669	3,456*
Lucor Corporation	119	0,093	1,656	3,468*
M & S Spitz Footwear Holdings	68	0,006	-0,095	-0,643
MacPhail Holdings	86	0,141	-0,817	-3,708*
Masonite (Africa)	118	0,145	0,704	4,439*
Mathieson & Ashley Holdings	93	0,126	1,202	3,617*
McCarthy Group	121	0,277	1,054	6,754*
Micor Holdings	105	0,151	0,511	4,284*
Mobile Industries	89	0,030	0,206	1,642
Montays	110	0,087	0,958	3,203*
Mooi River Textiles	115	0,066	0,509	2,827*
Murray and Roberts Holdings	121	0,287	1,324	6,917*
Natal Canvas Rubber Manufacturers	86	0,052	0,543	2,155*
Natal Consolidated Industrial Investment	100	0,140	1,080	3,993*
National Veneer Holdings	100	0,092	1,280	3,149*
Nictus Finansiële Instellings	110	0,006	0,414	0,806
Ninian & Lester Holdings	83	0,031	0,227	1,608

Northern Engineering Industries Africa	116	0,088	0,455	3,309[a]
Ocean Manufacturing Group	85	0,017	0,321	1,187
Oceana Fishing Group	116	0,122	0,655	3,974[a]
Omnia Fertilizers	102	0,029	0,662	1,731[b]
Otis Elevator Company	120	0,173	0,745	4,971[a]
Ovenstone Investments	121	0,203	0,828	5,502[a]
Picardi Investments	118	0,162	1,015	4,743[a]
Piccan	106	0,136	1,144	4,053[a]
Pick 'n Pay Stores	120	0,355	1,144	8,066[a]
Placor Holdings	121	0,395	1,256	8,816[a]
Plascon-Evans Paints	116	0,250	0,700	6,167[a]
Power Technologies	119	0,245	1,154	6,162[a]
Premier Industries	39	0,002	-0,192	-0,266
President Catering Supplies	100	0,147	0,688	4,103[a]
Progress Industries	115	0,102	0,986	3,577[a]
Quin Corporation	121	0,038	0,751	2,172[a]
Quinton Hazell Superite Holdings	120	0,029	0,445	1,868[b]
Rale Holdings	80	0,012	-0,368	-0,975
Rentmeesterbeleggings	115	0,064	0,525	2,777[a]
Reunert	116	0,053	0,613	2,515[a]
S.A. Bias Holdings	81	0,006	-0,139	-0,687
S.M. Goldstein	121	0,235	1,377	6,045[a]
Saficon Investments	117	0,221	0,851	5,717[a]
Saker's Finance and Investment Corporation	119	0,247	0,913	6,198[a]
Sam Steele Holdings	121	0,146	0,631	4,503[a]
Schus Holdings	111	0,039	0,435	2,096[a]
Sentrachem	121	0,294	1,229	7,035[a]
Silverton Tannery	20	0,099	0,241	1,406
Sinclair Holdings	121	0,121	0,913	4,054[a]
South African Associated Newspapers	83	0,011	0,257	0,948

South African Woollen Mills	77	0,008	0,211	0,771
Southern Sun Hotel Holdings	121	0,263	1,039	6,522[a]
Svenmill	119	0,130	0,924	4,187[a]
T.W. Beckett and Company	98	0,059	0,332	2,447[a]
Television and Electrical Holdings	120	0,269	1,341	6,581[a]
Textile Mills (1947) Holdings	29	0,000	-0,010	-0,038
Tollgate Holdings	121	0,188	0,886	5,247[a]
Towles, Edgar Jacobs	114	0,003	0,178	0,583
Triomf Fertilizer Investments	115	0,035	0,507	2,013[a]
Turf Holdings	90	0,005	0,113	0,635
Union Cold Storage of South Africa	56	0,021	0,282	1,079
Union Wine	117	0,090	1,015	3,381[a]
Vaderland Beleggings	121	0,148	0,921	4,546[a]
Veka	118	0,040	0,540	2,203[a]
W & A Investment Corporation	119	0,182	1,134	5,110[a]
Waicor	119	0,165	1,052	4,817[a]
Waltons Stationery Company	121	0,192	0,937	5,310[a]
World Funishers Group	114	0,087	0,749	3,269[a]
York Timber Organisation	61	0,000	0,005	0,037

[a] Indicates significance at the 5% level
[b] Indicates significance at the 10% level

APPENDIX E

Names of the companies used in the incremental information content analysis

The names of the companies are supplied together with the years in which they were included in the sample. If a particular year's data for a particular company is included, the table is marked with a "1". The company names supplied were extracted from the *Stock Exchange Handbook* and are those that were valid at the last year of inclusion in the sample. For ease of reference the word *The*, which sometimes forms part of a company's name, has been omitted.

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Abercom Group	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Adcock Ingram	1	1	0	0	0	0	0	0	0	0	0	0	0	0
African Cables	0	0	0	0	0	0	0	0	0	0	0	0	0	1
African Gate Holdings	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Alderson & Flitton Holdings	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Amalgamated Medical Services	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Anglo-Alpha	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Anglovaal Industries	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Aurochs Investment Company (SA)	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Autolec	1	1	1	0	0	0	0	0	0	0	0	0	0	0
B. & S. Steel Furniture Company	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Bakers South Africa	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Beares	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Berkshire International (SA)	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Berzack Brothers (Holdings)	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Blaikie-Johnstone	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Bonuskor	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Bradlows Stores	0	0	0	0	1	1	1	1	0	0	0	0	0	0
Brian Porter Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Brick and Potteries Company	1	1	0	0	0	0	0	0	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Buffalo Corporation	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Buffalo Timber and Hardware Company	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Calan	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Cashbuild	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Charmfit Holdings	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Chemical Services	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Claude Neon	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Clicks Stores	0	0	0	0	0	0	1	1	1	1	1	1	1	0
Columbus Holdings	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Concor	0	0	0	0	0	0	0	0	1	1	1	1	1	1
Consol	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Consolidated Textile Mills Investment Corporation	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Cullinan Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Currie Finance Corporation	0	0	1	1	1	1	1	1	1	1	1	1	1	1
Currie Motors (1946)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dan Perkins Holdings	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Desiree International	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Duro Industries	1	1	1	1	1	0	0	0	0	1	0	0	0	0
Duros	1	0	0	0	0	0	0	0	1	1	1	1	1	0
Eddels Holdings	1	1	1	1	1	1	0	0	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Edgars Consolidated	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Edgars Stores	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Edward L. Bateman	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Elgin Fireclay	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Ellerine Holdings	0	0	0	0	0	1	1	1	0	0	0	0	0	0
Empisal	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Ensign Clothing	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Eureka Industrial	1	1	1	1	0	1	1	1	1	0	0	0	0	0
Everite Group	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fintec	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Fowler Holdings	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Fraser Alexander	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Frasers	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Gallo Africa	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Garlick	1	1	1	1	1	1	1	1	1	1	1	1	1	0
General Optical Company	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Genrec Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Globe Engineering Works	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Goodhope Concrete Pipes	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Gresham Industries	1	1	1	1	1	1	1	1	1	1	1	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Grinaker Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Group Five	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gubb & Inggs	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gypsum Industries	1	1	1	1	1	1	1	1	1	1	1	1	1	1
H & J Supreme Cables & Electronics	0	0	0	0	0	0	0	0	0	1	1	0	0	0
Hanhill Industries	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Hart	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Hebox Textiles	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Highveld Steel and Vanadium Corporation	1	1	1	1	1	1	0	0	0	0	0	0	0	0
IFM Group	0	0	0	0	0	0	0	1	1	1	1	1	0	0
Industrial Investment Company	1	1	1	1	1	1	1	1	1	1	1	0	0	0
Industrial and Commercial Holdings Group	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Irvin & Johnson	1	1	1	1	1	1	1	1	1	1	1	1	1	1
James Brown & Hamer	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Jazz Stores	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Karoo Meat Exchange	0	1	1	1	0	0	0	0	0	0	0	0	0	0
Katz & Lourie	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Kersaf Investments	0	0	0	0	0	0	0	0	0	0	0	0	1	1
LHL Engineering	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Landlock	1	1	1	0	1	1	1	1	1	1	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
M & S Spitz Footwear Holdings	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Maccabee Industrial Finance	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Marshall Industries	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Masonite (Africa)	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Mathieson & Ashley Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
McCarthy Group	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Metkor Investments	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Metro Group	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Micor Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mitchell Cotts South Africa	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Mobile Industries	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Montays	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Murray and Roberts Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Natal Canvas Rubber Manufacturers	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Natal Chemical Syndicate	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Natal Consolidated Industrial Investment	1	1	1	1	1	1	1	1	1	1	0	0	0	0
National Bolts	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Nictus	1	1	0	0	0	0	1	1	1	1	1	1	1	1
Northern Free State Motors	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Ocean Manufacturing Group	0	0	0	0	0	0	0	0	0	0	1	1	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Perskor Groep	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Picardi Appliances	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Picardi Finance Company	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Picardi Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Picardi Hotels	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Picfoods	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Pleasure Foods	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pointer Fashion International	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Premier Paper	1	1	1	1	0	0	0	0	0	0	0	0	0	0
President Catering Supplies	0	0	0	0	1	1	1	1	1	1	1	0	0	0
Press Supplies Holdings	1	0	0	0	1	1	1	0	1	1	1	1	1	1
Pretoria Portland Cement Company	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Prima Industrial Holdings	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Primrose Industrial Holdings	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Protea Holdings	1	1	1	1	1	1	1	1	1	0	0	0	0	0
Putco	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Rentmeesterbeleggings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Reunert & Lenz	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Rex Trueform Clothing Company	1	1	1	1	1	1	1	1	1	1	1	1	1	1
S.M. Goldstein	0	0	0	0	0	0	0	0	0	1	1	1	1	1

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Safmarine Corporation	1	1	1	1	1	1	1	1	1	0	0	0	0	0
Safmarine and Rennies Holdings	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Safnit Mills	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Sasol	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Satmar	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Seardel Investment Corporation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Searles Holdings	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Sentrachem	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Shipwrights & Engineers Holdings	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Silveroak Industries	1	0	0	0	0	1	1	1	1	1	1	0	1	1
Simba-Quix	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Sinclair Holdings	0	0	0	0	0	0	0	1	1	1	1	1	1	1
South African Woollen Mills	1	1	1	1	1	1	1	1	1	1	0	0	0	0
South Atlantic Corporation	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Steel Metals	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Stellenbosch Farmers' Winery Group	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Suncrush	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Svenmill	0	0	1	1	1	1	1	1	1	1	0	0	0	0
T.W. Beckett and Company	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Television and Electrical Holdings	0	0	0	0	0	1	1	1	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Tollgate Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Towles, Edgar Jacobs	1	1	1	1	1	1	1	1	1	0	1	1	1	1
Tradegro	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trencor	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trio-Rand (SA)	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Truworths	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Turf Holdings	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Union Cold Storage of South Africa	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Union Wine	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Unisec Group	0	0	0	0	0	0	0	0	0	1	0	0	0	0
W & A Investment Corporation	1	1	1	1	1	1	1	1	0	0	0	0	0	0
W.F. Johnstone and Company	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Welfit Oddy Holdings	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Wispeco	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Wooltru	0	0	0	0	0	0	0	0	1	1	1	1	1	1
World Furnishers Group	0	1	1	1	1	1	1	1	0	0	0	0	0	0
Total per year	**120**	**114**	**106**	**98**	**92**	**83**	**77**	**75**	**72**	**71**	**63**	**58**	**57**	**55**

APPENDIX F

Names of the companies used in the income measurement perspective analysis

The names of the companies are supplied together with the years in which they were included in the sample. If a particular year's data for a particular company is included, the table is marked with a "1". The company names supplied were extracted from the *Stock Exchange Handbook* and are those that were valid at the last year of inclusion in the sample. For ease of reference the word *The*, which sometimes forms part of a company's name, has been omitted.

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Abercom Group	0	1	1	0	1	1	1	1	1	1	1	1	0	0
Acrow Engineers	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Adcock Ingram	1	1	0	0	0	0	0	0	0	0	0	0	0	0
African Cables	0	0	0	0	0	0	0	0	0	0	0	0	0	1
African Gate Holdings	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Alderson & Flitton Holdings	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Alex White Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Amalgamated Medical Services	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Anglo-Alpha	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Anglovaal Industries	1	1	1	1	1	1	0	1	1	1	1	0	1	0
Aurochs Investment Company (SA)	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Autolec	1	1	1	0	0	0	0	0	0	0	0	0	0	0
B. & S. Steel Furniture Company	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Bakers South Africa	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Barbican Industrial Holdings	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Basil Read Holdings	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Beares	1	1	1	1	0	1	1	1	1	0	1	1	1	0
Berkshire International (SA)	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Berzack Brothers (Holdings)	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Blaikie-Johnstone	1	1	1	1	1	1	0	0	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Bonuskor	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Bradlows Stores	0	0	0	0	1	1	1	1	0	0	0	0	0	0
Brian Porter Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Brick and Potteries Company	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Buffalo Corporation	0	0	0	0	0	1	1	1	0	1	1	1	1	1
Buffalo Timber and Hardware Company	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Calan	1	1	1	1	0	1	0	0	0	0	0	0	0	0
Cashbuild	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Charmfit Holdings	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Chemical Services	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Claude Neon	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Clegg Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Clicks Stores	0	0	0	0	1	1	1	1	0	1	1	1	1	0
Columbus Holdings	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Concor	0	0	0	0	0	0	1	1	1	1	1	1	0	1
Conshu Holdings	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Consol	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Consolidated Textile Mills Investment Corporation	1	1	1	0	1	1	0	1	1	1	0	0	0	0
Control Instruments Group	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Crown Food Holdings	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Cullinan Holdings	1	1	1	1	0	1	1	1	1	1	0	1	0	1
Currie Finance Corporation	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Currie Motors (1946)	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Dan Perkins Holdings	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Desiree International	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Dial-a-Movie	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Dispatch Media	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Duro Industries	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Duros	1	0	0	0	0	0	0	0	1	1	1	1	0	0
Eddels Holdings	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Edgars Consolidated	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Edgars Stores	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Edward L. Bateman	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Ellerine Holdings	1	0	1	1	1	1	1	1	0	0	0	0	0	0
Empisal	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Ensign Clothing	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Eureka Industrial	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Everite Group	1	1	1	1	1	1	1	1	1	1	1	0	1	1
Fintec	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Fowler Holdings	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Frame Group Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Fraser Alexander	0	0	0	0	0	0	0	0	0	0	1	0	1	1
Frasers	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Furniture Fair	0	0	0	0	0	0	0	0	0	0	0	0	1	1
GBS Holdings	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Gallo Africa	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Garlick	1	1	1	1	1	1	1	1	1	1	1	1	1	0
General Optical Company	1	1	1	1	1	0	1	1	1	1	1	1	0	1
Genrec Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Globe Engineering Works	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Goodhope Concrete Pipes	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Grant Andrews Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gresham Industries	1	1	1	1	1	1	1	1	1	1	1	0	0	0
Grinaker Holdings	1	1	1	1	1	0	1	1	0	1	1	1	1	1
Group Five	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Gubb & Inggs	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gypsum Industries	1	1	1	1	1	0	1	1	1	1	1	1	1	1
H & J Supreme Cables & Electronics	0	0	0	0	0	0	0	1	1	1	1	0	0	0
Hanhill Industries	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Hart	1	1	1	1	0	0	0	0	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Harwill Investments	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Hebox Textiles	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Highveld Steel and Vanadium Corporation	1	0	1	1	1	1	0	0	0	0	0	0	0	0
IEM Products	0	0	0	0	0	0	0	0	0	0	0	0	1	0
IFM Group	0	0	0	0	0	0	1	1	0	1	0	0	0	0
Ilco Homes	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Imperial Group	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Industrial Investment Company	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Industrial and Commercial Holdings Group	1	0	1	1	1	1	1	1	1	1	1	1	1	1
Interleisure	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Irvin & Johnson	1	1	1	1	1	1	1	1	1	1	1	1	1	1
James Brown & Hamer	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Jazz Stores	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Karoo Meat Exchange	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Katz & Lourie	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Katzenellenbogen	1	1	1	0	1	0	0	0	0	0	0	0	0	0
Kersaf Investments	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Klipton	0	0	0	0	0	0	0	0	0	0	0	0	1	1
LHL Engineering	1	1	1	0	0	0	0	0	0	0	0	0	0	0
Landlock	1	1	1	1	1	0	1	1	1	1	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Longmile	0	0	0	0	0	0	0	0	0	0	0	0	0	1
M & S Spitz Footwear Holdings	1	1	1	1	0	1	1	1	0	0	0	0	0	0
Maccabee Industrial Finance	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Market Motor Group	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Marshall Industries	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Masonite (Africa)	0	1	1	1	1	0	0	0	0	0	0	0	0	0
Mathieson & Ashley Holdings	1	1	1	1	1	0	1	1	1	1	1	1	1	1
McCarthy Group	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Metkor Investments	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Metro Group	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Micor Holdings	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Mitchell Cotts South Africa	1	0	1	1	1	1	0	0	0	0	0	0	0	0
Mobile Industries	1	1	1	1	1	1	1	1	1	1	0	1	1	1
Montays	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Movie Camera Company	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Murray and Roberts Holdings	1	1	1	1	1	1	0	1	1	1	1	1	1	1
Natal Canvas Rubber Manufacturers	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Natal Chemical Syndicate	1	0	1	1	1	1	1	1	1	1	0	0	0	0
Natal Consolidated Industrial Investment	1	1	1	1	1	1	1	1	1	1	0	0	0	0
National Bolts	1	1	1	1	1	1	1	1	1	1	1	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Nictus	1	1	0	0	0	1	1	1	1	1	1	1	0	1
Noristan Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Northern Free State Motors	1	1	1	0	1	0	1	0	0	0	0	0	0	0
Ocean Manufacturing Group	0	0	0	0	0	0	0	0	1	1	1	0	0	0
Pals Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Penrose Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Perskor Groep	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Picardi Appliances	1	1	1	1	1	1	0	1	1	1	1	1	1	1
Picardi Finance Company	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Picardi Holdings	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Picardi Hotels	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Picfoods	1	1	1	1	1	1	1	0	0	0	0	0	0	0
Pleasure Foods	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Pointer Fashion International	0	0	0	0	0	0	0	0	0	0	0	1	1	1
Premier Paper	1	1	1	0	0	0	0	0	0	0	0	0	0	0
President Catering Supplies	0	0	0	0	1	1	1	1	0	1	1	0	0	0
Press Supplies Holdings	1	1	1	1	1	1	1	0	1	1	1	0	1	1
Pretoria Portland Cement Company	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Prima Industrial Holdings	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Primrose Industrial Holdings	1	1	1	0	0	0	0	0	0	0	0	0	0	0

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Protea Holdings	1	1	1	1	1	1	1	1	0	0	0	0	0	0
Putco	1	1	1	1	1	0	1	0	1	1	1	1	1	1
Q Data	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Rentmeesterbeleggings	1	1	0	1	1	1	1	1	1	1	1	1	1	1
Reunert & Lenz	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Rex Trueform Clothing Company	1	1	1	1	1	1	1	1	1	0	1	1	1	1
Rubenstein Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Rusfurn Group	0	0	0	0	0	0	0	0	0	0	0	0	1	1
S.M. Goldstein	0	0	0	0	0	0	0	1	1	1	1	1	1	1
Safmarine Corporation	0	0	0	1	0	1	1	1	1	0	0	0	0	0
Safmarine and Rennies Holdings	0	0	0	0	0	0	0	0	0	0	1	1	1	1
Safnit Mills	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Sanlic Hardware Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Sasol	0	0	0	0	0	0	1	1	0	1	1	1	1	1
Satmar	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Seardel Investment Corporation	1	1	1	1	1	0	1	1	1	1	1	0	1	1
Searles Holdings	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Sentrachem	0	1	1	1	0	1	1	1	1	1	0	0	0	0
Shipwrights & Engineers Holdings	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Shoredits Holdings	0	0	0	0	0	0	0	0	0	0	0	0	1	1

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Siltek	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Silveroak Industries	1	1	1	1	1	1	1	1	1	1	1	1	0	1
Simba-Quix	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Sinclair Holdings	0	0	0	0	0	0	0	1	1	1	1	1	0	0
Sondor Industries	0	0	0	0	0	0	0	0	0	0	0	0	0	1
South African Freight Corporation	0	0	0	0	0	0	0	0	0	0	0	0	1	1
South African Woollen Mills	1	1	1	1	1	1	1	1	1	1	0	0	0	0
South Atlantic Corporation	1	1	1	1	1	1	1	1	1	1	1	1	1	0
Steel Metals	1	1	1	1	1	0	1	1	1	1	1	1	1	0
Stellenbosch Farmers' Winery Group	0	0	0	0	0	0	1	1	1	1	1	1	1	1
Strebel Group	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Suncrush	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Svenmill	0	1	1	1	1	1	1	1	1	1	0	0	0	0
Swimline Holdings	0	0	0	0	0	0	0	0	0	0	0	0	0	1
T.W. Beckett and Company	1	1	1	1	1	1	1	1	1	1	1	1	1	0
TPN Investments	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Television and Electrical Holdings	0	0	0	1	1	1	1	1	0	0	0	0	0	0
Tollgate Holdings	1	1	0	1	1	0	1	1	1	1	1	1	0	0
Towles, Edgar Jacobs	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Tradegro	1	1	1	1	1	1	1	1	0	1	1	0	1	1

Name	76	77	78	79	80	81	82	83	84	85	86	87	88	89
Transvaal Clothing Industries	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Trencor	1	1	1	1	1	1	1	1	1	1	1	0	1	1
Trio-Rand (SA)	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Triomf Fertilizer	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Truworths	1	1	1	1	1	0	0	0	0	0	0	0	0	0
Turf Holdings	1	1	1	1	1	1	1	1	1	1	0	0	0	0
Union Cold Storage of South Africa	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Union Wine	1	1	1	1	1	1	0	1	1	1	1	1	1	1
Unisec Group	0	0	0	0	0	0	0	0	0	1	0	0	0	0
W & A Investment Corporation	1	1	1	1	1	1	1	1	0	0	0	0	0	0
W.F. Johnstone and Company	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Welfit Oddy Holdings	1	1	1	1	1	1	1	1	1	1	1	1	0	0
Wispeco	1	1	1	1	0	0	0	0	0	0	0	0	0	0
Wooltru	0	0	0	0	0	0	1	1	1	1	1	1	1	1
World Furnishers Group	0	1	1	1	1	1	1	1	0	0	0	0	0	0
Total per year	**117**	**113**	**107**	**98**	**92**	**76**	**78**	**80**	**67**	**71**	**62**	**55**	**65**	**84**