

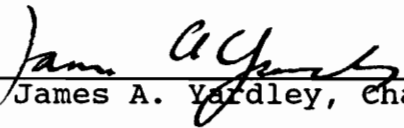
**The CAPM Approach to Materiality**

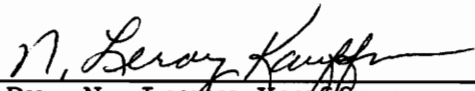
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Master of Accountancy

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# **The CAPM Approach to Materiality**

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(ABSTRACT)

Materiality is a pervasive accounting concept that has defied a precise quantitative definition. The Capital Asset Pricing Model (CAPM) approach to materiality provides a means for determining the limits that bound materiality. Also, the approach makes it possible to locate the point estimate within these limits based on certain assumptions.

### Acknowledgements

I would like to thank the members of my thesis committee for their help and express my gratitude to Dr. James Yardley for enthusiastically encouraging me to write a paper on the topic of materiality.

Materiality, like beauty, is in  
the eye of the beholder.  
(Hicks, 1964, p. 159)

In a profession where  
objectivity is a consideration  
of cardinal importance,  
materiality seems to be its  
"Achilles' Heel". (Bernstein,  
1967, p. 90)

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## Section 1

### The Issue

The concept of materiality is pervasive in accounting and in auditing. In many ways, materiality is what stands between a clean and qualified audit report. Auditors do not guarantee that the amounts depicted in the financial statements of their clients are correct and accurate. What auditors offer is an "opinion" as to whether or not the financial statements are materially misstated; therefore, auditors give clean opinions knowing that the financial statements are not free of errors. An audit that provides assurance of accuracy would be 1) undesirable because of prohibitively large costs and 2) impossible because of the potential for human error. However, materiality has defied any meaningful and objective definition.

The term "materiality" made its official debut in accounting in 1920 when it was included in an ethics rule of the Institute. Although the term had been used in accounting literature since the beginning of the century, the need for a definitive meaning was not recognized until the 1930s (Holmes, 1972). The Securities Acts of 1933 and 1934 opened the doors for third parties to sue auditors for negligence and misrepresentation. Reininga (1968) observed that the growing appearance and discussion of the term materiality parallels

the growing responsibility of independent accountants under Securities and Exchange Commission (SEC) regulations.

Auditors have been found liable under section 10(b) of the Securities Act of 1934. Of particular interest is the clarification of section 10(b) in 1942 by means of rule 10b-5 which states that "it shall be unlawful for any person ... to make any untrue statement of a material fact or to omit to state a material fact necessary in order to make the statements, in the light of the circumstances under which they were made, not misleading" (Jeffries, 1981, p. 14). Jeffries explores the development of the term materiality in the court room, demonstrating that the term has been inconsistently defined among courts and across time. Three cases deserve mention: 1) In *Kardon v. National Gypsum Co.* (1947) materiality was defined for the first time as being dependent on the "judgment of the other party to the transaction," 2) in *Kohler v. Kohler Co.* (1963) materiality was defined in terms of stock price changes, and 3) in *List v. Fashion Park, Inc.* (1965) materiality was defined in terms of the "average prudent investor".

It is noteworthy that SEC's Rule 1-02 of Regulation S-X defined materiality in terms of the "average prudent investor" before the *List* case (U.S. Securities and Exchange Commission, Reg. S-X Paragraph 1-02). Although help in defining materiality from SEC and the Financial Accounting Standards

Board (FASB) would be welcomed by the judiciary, the judiciary would not hesitate to critically evaluate the appropriateness and sufficiency of such help. This point is made clear by a court of appeals ruling concerning the Continental Vending case: (Wright and Taylor, 1982, p. 305)

We do not think the jury was ... required to accept the accountants' evaluation whether a given fact was material ... at least not when the accountants' testimony was not based on specific rules or prohibitions to which they could point, but only on the need for the auditors to make an honest judgment and the conclusion that nothing in the financial statements negated the conclusion that an honest judgment had been made.

Most observers agree that materiality has been defined too vaguely by SEC and by FASB to provide any useful guidance and protection to the practicing independent accountant. Hylton (1961, p. 63) suggested that materiality "is too dangerous an item to have 'on the loose'" while Bernstein (1967, p. 90) claimed that analyzing and describing the materiality judgment process is imperative because "an undefined and all-embracing process described as 'judgment' does not inspire the confidence of thinking men ... [and] is conducive to the kind of practice most likely to discredit the profession."

Yet, another danger related to the potential legal liability of auditors can be demonstrated by the controversial findings of the Bar Chris case. Judge McLean found that a 14% and 13% overstatement of net operating income and earnings per share respectively were not material whereas a 13.5% and 14% overstatement of current assets and working capital ratio respectively were material. Almost every study of materiality identifies earnings to be the most accepted materiality base by both auditors and investors. Current assets ranks among the least important. Judge McLean considered the earnings trend to be a better materiality base than earnings. Furthermore, McLean seemed to believe that current assets was a better materiality base than earnings. The subjectivity or arbitrariness of the decision was recognized when McLean said that "since **no one knows** what moves or does not move the mythical 'average prudent investor', it comes down to a question of judgment, to be exercised by the trier of the fact as best he can in the light of all the circumstances." (Levy, 1970, p. 305) [emphasis added]

## Section 2

### Focus of the Paper

My focal point is the quantification of materiality at the overall financial statement level. Arbitrariness in the determination of materiality thresholds is scrutinized. I approach materiality in an analytical and objective manner through modern finance theory that describes what moves the "average prudent investor." After reviewing the existing literature, a finance-oriented approach is proposed with the explicit goal of limiting the arbitrariness of materiality judgments. The qualitative materiality aspects of individual errors and the allocation of the overall materiality measure to individual accounts are beyond the scope of this paper. The finance-orientation assumes that investors are the users of financial statements and the approach is based on observable market data such as stock prices and betas. As a result, the approach is applicable to public companies whose shares are traded in a stock exchange.

### Section 3

#### Literature Review

Most materiality studies have been empirical. I categorize them into four major groups. Group A studies focus on the end result of the materiality judgment -- the materiality threshold. Group B studies are primarily concerned with the underlying materiality judgment process. They focus on the relative significance of various materiality bases. Group C studies investigate the correlation of accounting data with stock prices. The results of Group C studies have the potential of providing normative support to the findings of Group B studies. By assuming that the observed reaction of investors to various accounting information is an indicator for the appropriateness of different accounting materiality bases, Group D studies compare different normative materiality standards.

#### Group A studies:

Two early empirical studies were performed by Woolsey in 1954. Woolsey (1954a) sent ten questionnaires to CPAs, controllers, financial analysts, professors of accounting, and others. Subjects were asked their materiality yardstick concerning extraordinary charges specifically related to a) earthquake loss, b) bond discount written off, and c) gain on

fixed assets. The findings indicated that most subjects determined materiality in relative terms using current income before taxes as the basis for comparison, while a small number of subjects indicated that they considered the material amount to be either primarily or partly an absolute figure. The percentage of income considered material varied greatly both among and within the groups. National CPAs had the highest materiality threshold. Their materiality threshold was substantially higher than local and regional CPAs.

Woolsey (1954b) extended his previous study to cover long-term leases, marketable securities, and contingent liabilities. Basically, he found similar results except for the case of contingent liabilities. Twenty-nine percent of the subjects indicated that their materiality decisions were primarily based on the absolute dollar amount of the contingency and another 29% measured materiality relative to working capital rather than earnings.

Neumann (1968) examined the annual reports of a sample of 300 companies from 1964 Fortune 500 companies in order to determine if uniform materiality measure can be discerned regarding the impact of (1) accelerated depreciation allowed by the Revenue Act of 1954, and (2) the change in investment credit reporting adopted by the Accounting Principles Board in 1964. Nondisclosure of the effect of the above events on net income was the materiality item which was compared with the

corresponding audit opinion in order to make an inference about the underlying materiality threshold. Neumann found a wide variation in auditors' materiality thresholds for both events.

Jennings, Kneer, and Reckers (1987) conducted two empirical studies to determine the degree of agreement among and within various groups regarding materiality thresholds. In the first study 121 CPAs, 90 attorneys, and 56 judges were asked their materiality threshold concerning one of four cases related to: (1) inventory loss, (2) eminent domain, (3) lawsuit, and (4) bribe. The results show variability of materiality thresholds in three dimensions: (1) across cases, (2) among groups, and (3) within groups. Furthermore, the majority of attorneys and judges, 61% and 72% respectively, advocated the establishment of an explicit materiality standard whereas 82% of CPAs did not like the idea of an explicit standard.

In the second study, CPAs, CFAs, bank loan officers, and credit managers were provided with five cases, four similar to those of the first study and one pertaining to a product line loss, and they were asked their materiality thresholds for each case. The three dimensional variability exhibited in the first study was essentially replicated in the second study.

The main findings of Group A studies is that the quantification of materiality results in a great variability



of materiality thresholds under a given set of circumstances. Higher average materiality threshold is exhibited by auditors compared to users.

#### Group B studies:

Boatsman and Robertson (1974) developed 30 short cases containing eight variables assumed to be relevant to materiality decisions. Those variables were (1) the nature of the item (a gain or loss on the sale of fixed assets, an accounting principle change, or a contingency), (2) current net income, (3) total revenue or expense, (4) net working capital, (5) growth rate of earnings, (6) reversal or not of earnings trend, (7) the absolute size of the item, and (8) risk expressed on a five-point scale. The cases were administered to CPAs and financial analysts who were asked to sort the 30 cases into three groups according to the type of disclosure demanded by the materiality of the item. The three types of disclosure were: (1) no disclosure, (2) footnote disclosure, and (3) line item disclosure on the face of the financial statements. Using multiple discriminate analysis, Boatsman and Robertson developed a multivariate model that could predict the correct type of disclosure in 63% of the cases. By defining immaterial items as those requiring no disclosure and material items as those requiring either footnote or line item disclosure, the predictive power of the

model increased to 84%. An analysis of the relative significance of the underlying individual variables revealed that earnings was the single most important variable. Specifically, 73% of the predictive power of the multivariate model was attributed to earnings, 24% was attributed to the nature of the item (in particular, the dummy variable indicating that the item was a gain or loss on the sale of fixed assets), 2% was attributed to the risk variable, and less than 1% was attributed to the other five variables. A simple model based on earnings, specifically 4% of net income, could correctly distinguish between immaterial and material items in 65% of the cases.

Moriarity and Barron (1976) treated materiality as an ordinal variable using conjoint measurement methods to determine the structure of materiality decisions as well as the scale values of the underlying materiality bases. The materiality bases examined were: (1) earnings, (2) earnings trend, and (3) total assets. Fifteen audit partners participated in the experimental task which involved ranking situations according to their degree of materiality. The results indicate that earnings was considered the most important variable with earnings trend and total assets being distant second and third in importance respectively. The majority of audit partners used an additive model which amounts to adding the scaled effects of all variables.

However, each audit partner exhibited a different additive model. Four audit partners used a configural model whereby one variable is dependent on another variable. Two other partners placed no reliance whatsoever on earnings trend and total assets.

Ward (1976) interviewed twenty-four CPAs and asked them to sort twenty materiality items into five groups of prespecified size. Using the Q-sort comparative rating method, Ward developed a consensus ordering of the materiality factors indicating their relative significance. He reached the conclusion that there was significant agreement between the auditors as to the relative importance of the twenty materiality factors. However, most of the materiality factors Ward used in his study were either qualitative or not readily transformable into quantitative materiality bases. For example, the most important factor was compliance with professional standards but such a factor would more likely be related to the qualitative aspect of individual errors rather than the quantification of materiality at the overall financial statement level.

Hofstedt and Hughes (1977) asked nineteen MBA students to state the probability of their insisting to disclose a loss from a subsidiary's writedown as an extraordinary item based on three variables: (1) operating income, (2) parent investments, and (3) subsidiary book value. Despite the

simplicity of the task, the subjects frequently exhibited logical errors of consistency raising substantial doubt as to the degree of consistency of auditors' materiality judgments in realistically complex situations. The study showed that simple models were as good as complex models and that income was the most important variable.

Firth (1979) designed thirty cases containing an extraordinary gain or loss of various magnitudes, based on thirty actual stock exchange listed companies in U.K. He asked auditors from three of the "Big 8" accounting firms, industrial accountants (preparers), and financial analysts (users) to determine whether the extraordinary item was material enough to warrant disclosure. The variables examined were: (1) earnings, (2) net assets, (3) total assets, (4) market capitalization, (5) sales turnover and (6) current assets. Analysis of variance indicated that only the first four variables were statistically significant. Earnings was the most important variable and next in importance was net assets. With respect to the other two variables, auditors considered total assets as more important than market capitalization but when all groups (auditors, preparers, and users) were considered together, market capitalization was more important than total assets. Moreover, auditors exhibited higher materiality threshold on average than users but lower than preparers.

Krogstad, Ettenson, and Shanteau (1984) asked ten audit partners, eleven audit seniors, and eleven audit students to indicate the degree of materiality and type of audit opinion warranted by an understatement of the allowance of doubtful accounts with respect to 32 cases -- 16 of which being replications. The cases manipulated five nonfinancial variables and three financial variables (earnings, earnings trend, and current ratio). The results indicate that audit partners and seniors relied primarily on earnings for their materiality decisions and made relatively little use of nonfinancial variables. In contrast, students did not rely heavily on any particular variable and more than half of their judgment's variability was attributed to nonfinancial variables. Furthermore, the judgment consistency of students was significantly lower than that of auditors. The preceding findings suggest that students are not good surrogates for auditors in studies requiring materiality judgments because such relatively unstructured judgments seem to be affected by experience.

The findings of Group B studies indicate that earnings is perceived to be the most important materiality base (see table 1 of appendix A). In fact, a simple model based on earnings can capture most of the predictive ability of a complex multivariate model.

### Group C studies:

Market-based studies are not really materiality studies in the sense that they were not performed for the sake of determining materiality. Nevertheless, the findings of these studies present implications for materiality, and as a result, they warrant consideration. One example of a research area that was not intended for, but yet indirectly impacts on, materiality concerns market efficiency. Specifically, there are three hypotheses related to market efficiency. The first hypothesis assumes a weak form efficiency whereby historical information such as past stock prices are impounded in current stock prices. The second hypothesis assumes a semi-strong form efficiency whereby all publicly available information is impounded in the stock prices. The third hypothesis assumes a strong form of market efficiency whereby stock prices reflect all public, private, and insider information. Fama (1970) covers very thoroughly the relevant studies which provide substantial empirical support for the weak and semi-strong forms of market efficiency but not for the strong form efficient hypothesis since there is evidence showing that insider information can render abnormal results. The immediate implications are that investors cannot make an abnormal return by trading on financial statement information, and financial statements are only one of many sources of information impounded in stock prices.

Another market-based research area that bears more heavily on materiality is the association of accounting earnings with stock prices. Beaver (1989) provides an excellent summary and insightful interpretation of the various types of evidence in this area. The first and probably most important type of evidence discussed by Beaver is the positive correlation between accounting earnings and stock prices. However, the correlation is not perfect, and the relationship or sensitivity of stock prices to accounting earnings is less than one-to-one, which means that a one percentage change in accounting earnings is associated with a less than one percentage change in stock prices. The average sensitivity was found to be around .3 in a study performed by Beaver, Lambert, and Ryan (1987). This low but statistically significant sensitivity of stock prices to accounting earnings is interpreted by Beaver (1989) as an indication that accounting earnings consist of a permanent and a transitory component. Basically, investors primarily respond to changes in long-term sustainable (permanent) earnings as opposed to one-time (temporary or transitory) earnings and changes in reported earnings arising from accounting changes having no economic substance.

Beaver presents several studies showing that investors look behind accounting numbers and take into consideration the accounting methods used. For example, a study by Beaver and

Duke (1973) showed that the average price-earnings ratio of companies that use accelerated depreciation is higher than the price-earnings ratio of companies that use straight-line depreciation *ceteris paribus*. This finding is consistent with the hypothesis that the method of depreciation impacts on accounting earnings but not on stock prices. Accounting earnings are understated under the accelerated method of depreciation as opposed to the straight-line method, while the value of the company is not changed because economic depreciation remains the same regardless of the accounting depreciation method used for reporting purposes. In fact, the evidence shows that when the accounting earnings of the companies using straight-line depreciation are restated using accelerated depreciation, the price-earnings ratios become substantially the same.

Another area of empirical evidence supporting the conclusion that accounting earnings possess a transitory component concentrates on the association of market beta with accounting beta. A study by Beaver, Kettler, and Scholes (1970), show that the systematic or undiversifiable risk as measured by the volatility of stock price (market beta) is significantly positively correlated with the volatility of accounting earnings (accounting beta).

The preceding evidence on market-based studies indicates the existence of a permanent and a transitory component of



accounting earnings. The distinction between permanent and transitory earnings has important implications on materiality and these implications will be extensively analyzed in section seven.

#### Group D studies:

A relatively recent research area concerns the comparison of various materiality standards or rules of thumb. In one such study, Pany and Wheeler (1989) conducted an inter-industry comparison of materiality standards in terms of magnitudes and stabilities. Ten materiality standards were computed from data pertaining to 330 companies from 25 industries for the years 1977 to 1986 as follows: 1) 5% of pre-tax income, 2) 0.5% of total assets, 3) 1% of equity, 4) 0.5% of revenues, 5) sliding scale of gross profit (developed by CICA), 6) an average of the previous five standards, 7)  $1.6 \times [\text{greater of assets or revenues}]^{2/3}$  (called audit gauge and developed by Peat Marwick), 8)  $0.038 \times [\text{revenues}]^{.867}$ , 9)  $0.146 \times [\text{pre-tax income}]^{.942}$ , and 10)  $0.271 \times [\text{net income}]^{.894}$ . The results indicate that the rankings of magnitudes of the materiality thresholds were dependent on the specific industry. Likewise, the stability of a certain materiality standard was different for different industries and consequently materiality standards were more or less stable

than other standards depending on the specific industry. Overall, the audit gauge was the most stable standard providing one of the lowest materiality thresholds in all industries except the financial industries.

## Section 4

### Methodology

The materiality issue exists because no one has advanced a materiality framework that objectively captures investors' materiality threshold. The profession needs a theoretically sound normative standard which, albeit prescriptive from the auditors' perspective, will be based on descriptive theory of investors' behavior. Therefore, my approach is primarily normative, employing analytical techniques and logical inference. First, I investigate the advantages and disadvantages of available normative materiality standards. Second, I propose a normative standard based on the descriptive Capital Asset Pricing Model (CAPM) from finance. Third, I develop a theoretical materiality framework that is instrumental in the construction of a materiality continuum specifying the theoretical higher and lower limits of materiality. Finally, the CAPM approach to materiality is compared with four traditional standards in an empirical study.

Section 5  
Normative Materiality Standards

Almost all materiality standards take the form of rules of thumb which measure materiality relative to some base such as net income, total assets, net sales or net worth. This general approach is consistent with the empirical evidence describing materiality judgments. However, some studies (for example, Woolsey [1952a]) have shown that a small minority of experimental subjects consider the absolute size of materiality items (claiming for instance that \$10,000 is always material). This finding has probably misled some observers to believe that the size of the dollar amount of an error is in itself a determinant factor of materiality.

Measuring materiality in absolute terms is an oxymoron because materiality is defined in terms of users. An error in the financial statements of a company is deemed to be material if the error has the potential to cause an "average" investor (user) to change investment position. An investor will change investment position when he believes that a company is undervalued or overvalued compared to the price of its stock and when the potential gain of assuming the new investment position, as opposed to remaining in the old investment position, will more than cover any related transaction costs. The impact of an error on the stock price of a company is

dependent upon the size of the error relative to the size of the company. Therefore materiality is measured in relative terms.

A simple example illustrates that materiality cannot exist in a vacuum, but can only co-exist with other measures (eg. company size, company earnings, or earnings-per-share) that serve as a point of reference. Company A has net income of \$100,000, share equity of \$1,000,000 (1,000,000 common shares of \$1 par), and earning-per-share (EPS) of 10 cents ( $\$100,000/\$1,000,000$ ). Company B has net income of \$10,000,000, share equity of \$100,000,000 (100,000,000 shares of \$1 each), and EPS of 10 cents ( $\$10,000,000/\$100,000,000$ ). Assuming that the financial statements of both companies contain an aggregate error that overstates their net incomes by \$10,000, the actual EPS figures of Company A and B are 9 cents ( $\$90,000/\$1,000,000$ ) and 9.99 cents ( $\$9,990,000/\$100,000,000$ ) respectively. The assumption that the materiality of the error or misstatement of income depends on its absolute size as opposed to its relative size would only hold if investors were indifferent between EPS of 9 cents and EPS of 9.99 cents. Investors, however, prefer higher EPS rather than lower EPS. Therefore, the materiality of an error decreases as the error-per-share decreases. Mathematically, the limit of the error-per-share is zero as equity becomes infinitely large. In the example, the error-per-share for the

small Company A is one cent whereas for the large Company B the error-per-share is only one hundredth of a cent.

Materiality is by definition a relative measure that depends on the relative impact of an error on the financial statements initially and ultimately on the value of the company as perceived by users. Determining the relative impact of an error on the financial statements is a straight-forward task. For example, the \$10,000 aggregate error in the financial statements of Company A could be stated in relative terms as a 1 cent overstatement of EPS. The difficult part is to determine the ultimate impact on the value of Company A. There is no straight-forward relationship between financial statements and stock prices (see Beaver [1989] for an excellent summary of the relevant empirical findings). Financial statements are just one source of information that is reflected on stock prices. The inability to objectively define the relationship between accounting data and stock prices has led auditors to rely on their judgment in assessing the potential impact on stock prices of a certain level of misstatement in the financial statements.

Normative materiality standards in the form of rules of thumb (RTs) have evolved in order to facilitate materiality judgments as well as increase consistency and comparability. RTs are very simple relationships involving a materiality base (MB) component and a materiality percentage (MP) component.

The latter component can take the form of a percentage range indicating a gray area where auditors are required to apply their judgment. The product of the two components is the materiality threshold (MT) which can be mathematically depicted as:

$$MT = MB \times MP$$

Table 2 of appendix A presents materiality percentages to be applied on earnings (a common materiality base) as proposed by various individuals or groups based on their research, experience, and judgment.

Earnings has emerged as the predominant base due to its relevance; however, the instability of earnings is thought to be a significant disadvantage and has motivated the use of other more stable bases such as net worth, total assets, and sales revenue. Relevance and stability are the two most desirable characteristics of a materiality base but, unfortunately, there is usually an inverse relationship between these characteristics. For example, earnings is a more relevant base than total assets or sales but total assets and sales are more stable. As a result, total assets or sales seem to be more appropriate bases than earnings when earnings are unusually low or almost zero.

There are two ways to increase the stability of earnings. The first is to use gross profit instead of net income and the

second is to use average net income. In either case, some relevance is lost.

Gross profit excludes certain expenses that can vary considerably from one company or industry to another. Similarly, the relationship of gross profit to normal net income can be different. For example, the expenses excluded from gross profit are proportionally higher and gross profit is proportionally lower for retailing companies than for manufacturing companies. As a result, gross profit is less comparable and relevant than net income.

Average income is a much more stable base than current income. When current income is abnormally low, for example, average income can be used as a surrogate for normal current income. The average income of prior years is relevant only to the extent that is indicative of normal current income. The relevance of average income will suffer as the firm undergoes rapid changes in terms of size or permanent profitability.



## Section 6

### Proposition

All traditional materiality standards are based on accounting materiality bases. I propose the use of an economic base that is both stable and relevant. The base is simply normal economic earnings which can be calculated by means of the Capital Asset Pricing Model (CAPM). The model delineates a positive linear relationship between systematic or undiversifiable risk (beta) and rate of return (r). Basically, investors require a higher rate of return from a company with high undiversifiable risk as opposed to a company with low undiversifiable risk. The exact relationship between beta and return can be depicted by the following formula:

$$r_k = r_f + [\text{beta} \times (r_m - r_f)]$$

The formula simply states that the required rate of return of a particular company ( $r_k$ ) is equal to the sum of the risk-free rate of return ( $r_f$ ) and a required risk premium. The required risk premium of a company is equal to the product of its undiversifiable risk (beta) and the market risk premium ( $r_m - r_f$ ). The market risk premium is the difference between the market rate of return ( $r_m$ ) and the risk-free rate of return (see Sharpe and Alexander [1990] for an expanded coverage of CAPM and a proof of the above formula).

The CAPM formula can also be graphically depicted. In order to plot the line representing a positive linear relationship between risk and return, two points on the line must be determined. These points are the risk-free rate of return and the market rate of return. Although CAPM is a descriptive model based on ex ante (ie. before the fact or expected) betas and returns, ex post (ie. after the fact or observed) betas and returns provide approximations for model values. Brigham and Gapenski (1991) show how the risk-free rate of return and the market rate of return can be estimated based on selected data from a study by Ibbotson Associates covering the years 1926 through 1989. Specifically, they consider the arithmetic mean of the total returns of common stocks for the aforementioned period (12.4%) to be a surrogate for the market rate of return. Also they consider the arithmetic mean of long-term government bonds (4.9%) to be the appropriate surrogate for the risk-free rate of return. Appendix B provides a graphical representation of the capital asset pricing model based on the ex post surrogates discussed above.

Having estimated CAPM, the normal economic earnings (E) of a company can be determined by inserting the company's beta into the CAPM formula to find the required rate of return (r) and then multiplying the required rate by the company's market value (MV). Mathematically,

$$E = r \times MV$$

To illustrate the determination of normal economic or CAPM earnings, assume that Company A, from the example in the previous section, has a beta of 0.81 and a stock price of \$1.10. According to the CAPM formula, the required rate of return corresponding to a beta of 0.81 is 11%. Since Company A has 1,000,000 shares, its market capitalization or market value is \$1,100,000 (1,000,000 x \$1.10) and its economic income must be \$121,000, which is the product of the market capitalization (\$1,100,000) and the required rate of return (11%).

Economic earnings (\$121,000) can be different from accounting earnings (\$100,000). A need to define the relationship between these two types of earnings is not eliminated by use of economic earnings because the resultant materiality threshold will be applied to accounting rather than economic data. A fundamental feature of the CAPM approach to materiality is to concentrate auditors' judgment on the determination of a level of materiality percentage that best reflects the association of accounting with economic data, while utilizing an objective materiality base that maximizes relevance, consistency, and comparability.

## Section 7

### Theoretical Framework

In this section, I develop a theoretical framework for materiality in order to facilitate and provide insight into the determination of a materiality percentage to be used in conjunction with CAPM earnings. Appendix J provides an overview of the framework's main features, which are discussed in detail in the following subsections. Also, the theoretical analysis leads to construction of a materiality continuum based on relative impact of materiality on transitory and permanent components of economic earnings.

#### Accounting Earnings and Policies:

Accounting earnings are not equal to economic earnings because of the accounting policies used. For example, using accelerated depreciation as opposed to straight line depreciation will result in higher depreciation expense and consequently lower accounting income. However, economic depreciation remains the same regardless of which accounting method is used for reporting it. Therefore, differences in accounting income that are attributed to such accounting methods have no economic substance. But accounting policies such as depreciation methods are not the only reason for the difference between accounting and economic income. The more

fundamental difference arises from the historical cost paradigm of accounting. Accounting income is the increase in the book value of a firm whereas economic income is the increase in the market value of the firm, ignoring dividends which would be the same under both calculations.

The impact of accounting policies is to some extent dependent on the specific company since companies can choose among alternative accounting policies. Even when the same accounting policies are being used, the impact of those policies may still differ from one company to another because of different surrounding circumstances.

I assume that the impact of accounting policies is not significant and accounting earnings are approximately equal to economic earnings. This rather conservative assumption enables me to focus on the far more important issue of which component of earnings is being hit by materiality and how its misstatement affects market value or stock prices.

#### Economic Earnings and Market Value:

Because of conditions in the economy as well as company specific conditions, future earnings stream of a company is not expected to be absolutely stable. Instead, it is expected that there will be differences in economic earnings from one year to another. These differences can be attributed to the transitory component of earnings because permanent earnings

are by definition stable. If permanent earnings expectations change, the price of the firm will change.

What part of a certain year's earnings is permanent and what part is transitory? To answer this question permanent earnings must be mathematically defined. Permanent earnings is equal to the product of the market value of a firm and its normal rate of return as indicated by the CAPM. In other words, permanent earnings is CAPM earnings. Transitory earnings, on the other hand, is the expected yearly deviation from CAPM or permanent earnings. The important relationship between the two components is that permanent earnings is like a mean that averages out transitory earnings over the long-term. Therefore, permanent earnings are capitalizable by means of the CAPM whereas transitory earnings are not capitalizable.

This does not mean that transitory earnings are inconsequential. The consequences of expected transitory earnings are impounded in the calculation of expected permanent earnings. However, unanticipated transitory earnings which are not impounded in permanent earnings are consequential because they change the expected permanent earnings.

Consider, for example, that five numbers (7,6,3,4,5) represent the expected earnings stream of an asset. If the average of these numbers (5) is the permanent earnings of the

firm, the deviation of each number from the average (+2,+1,-2,-1,0) becomes the transitory component in each period. If the actual earnings in the first period is 2 instead of 7, there would be a -5 unanticipated transitory component that causes the expected permanent earnings to decrease from 5 to 4  $[(2+6+3+4+5)/5]$ . The value of the asset has decreased from 25  $(7+6+3+4+5)$  to 20  $(2+6+3+4+5)$ . This decrease is equal to the unanticipated transitory earnings. The percentage of decrease in the value of the asset is equal to the percentage decrease of the permanent earnings. These relationships are important because they are applicable to the valuation of assets using the CAPM model.

In order to illustrate the capitalization of permanent earnings as well as the indirect capitalization of unanticipated transitory earnings, assume that the above asset is a company whose earnings stream extends to infinity, and the company pays all earnings as dividends. Since all earnings are paid as dividends, the company will not experience any growth in dividends, and investors expect an average of \$5 in dividends per period.

The market value (MV) of the company can be determined by capitalizing CAPM earnings (E) using the required rate of return (r) that corresponds to the company's systematic risk (beta). Assuming a 10% required rate of return, the market value of the company would be \$50 calculated as follows:

$$MV = E / r \quad (1a)$$

$$MV = \$5 / .10 = \$50$$

The above model calculates the sum of all future earnings discounted at 10% when the earnings stream extends to infinity.

Investors expect periodic or annual deviations from permanent earnings but the present value of these deviations or expected transitory earnings will be zero. In essence, permanent earnings is defined as that level of equal periodic earnings that, when discounted, would be equal to the discounted actual unequal periodic earnings.

If the actual deviation is different from the expected deviation in the current period, the sum of the present values of all future expected deviations plus the current year actual deviation will not be zero but will be equal to the difference between the actual and the expected deviation in the current period. The expected permanent earnings would have to be recalculated so that the sum of future and current deviations would sum up to zero again. This impact on permanent earnings reflects the exact extent to which unanticipated transitory earnings are being capitalized. For example, if the earnings in the first period was \$4 instead of the expected \$7 and the \$3 decline was unanticipated, the value of the company would drop to \$47 from \$50. Permanent earnings would be revised as follows:



$$E = r \times MV \quad (1b)$$

$$E = .10 \times \$47 = \$4.7$$

If the decline in current year's earnings is interpreted as a permanent decline in profitability, permanent earnings would be \$2 instead of \$5. The \$3 decline in permanent earnings would cause a \$30 decline in market value, calculated as follows:

$$MV = E / r$$

$$MV = \$2 / .10 = \$20$$

If some of the unanticipated decline is interpreted as permanent and some as transitory, the decline in market value would be between \$3 and \$30.

A materiality continuum can be constructed whereby the lower limit is represented by an assumption of a 100% impact of a material amount on permanent earnings and the higher limit is represented by an assumption of a 100% impact on transitory earnings. The following discussion explores factors affecting the proportional impact of a material amount on permanent and transitory earnings.

Assume that materiality is more likely to represent an overstatement of income rather than an understatement. This presumption is recognized in accounting and in auditing. Accounting standards are usually conservative in the sense that they emphasize the recognition of liabilities rather than assets, understating net assets and net income. For example,

contingent losses are recognized but not contingent gains. In auditing, when the accounts receivable account is being examined, the auditor is looking for overstatements whereas when the accounts payable is being examined, the auditor is looking for understatements.

To the extent that materiality consists of an aggregate error representing management's effort to overstate income, a material amount should be fully capitalizable because this effort is likely to persist in the future. In other words, management will overstate income year after year on a permanent basis. If management manipulates income to different degrees each year to smooth earnings and thereby decrease the variability of the company's earnings, the yearly overstatements could be perceived as unanticipated transitory earnings that require indirect capitalization. Errors and irregularities can be considered unanticipated transitory earnings that also require indirect capitalization. However, as shown previously, the indirect capitalization of unanticipated transitory earnings is less extensive than the capitalization of permanent earnings.

#### AMT vs. IMT

I distinguish materiality at the financial statement level, hereafter called accounting materiality threshold (AMT), from materiality at the market value level, hereafter

called investment materiality threshold (IMT). AMT represents a misstatement of reported earnings whereas IMT represents a misstatement of market value or stock price. Note that appendix J includes a materiality threshold (EMT) at the economic earnings level. However, economic and accounting materiality thresholds are assumed to be the same based on the initial assumption, in the subsection on accounting earnings and policies, that economic and accounting earnings are approximately equal.

In the absence of transaction costs IMT would be zero and any change in the perceived market value of a company would be instantly impounded in its stock price. However, when transaction costs are present, a slight change in the implicit market value of a company may not be reflected in its stock price. These transaction costs can run as low as 0.35% of the invested amount for large sophisticated institutional investors to 8% for small investors. Since large investments have the potential to affect stock prices, it is conservatively appropriate for materiality purposes to assume a transaction cost percentage that is near the lowest end of the range, probably not to exceed 0.5%. The product of this low transaction cost percentage (TC%) and market value is equal to the theoretical total transaction costs (TC) necessary to buy or sell all outstanding stock of a company. This theoretical total transaction cost is the definition of

IMT which can be mathematically represented as follows:

$$IMT = TC = TC\% \times MV \quad (2)$$

### Materiality Continuum:

The higher limit of a materiality continuum is set by assuming that materiality represents an unanticipated change in the transitory component of earnings. Then, there is a dollar for dollar effect on market value. Mathematically,

$$AMT = IMT \quad (H)$$

The lower limit is set by assuming that materiality impacts solely the permanent component of earnings, in which case full capitalization is required. This capitalization can be achieved by incorporating materiality in equation (1a) as follows:

$$MV = (E / r) \quad (1a)$$

Subtracting a material amount from MV and E:

$$(MV - IMT) = (E - AMT) / r$$

$$MV - IMT = (E / r) - (AMT / r)$$

$$MV - IMT = MV - (AMT / r)$$

Subtracting MV from both sides and changing the signs:

$$IMT = AMT / r$$

Rearranging the terms:

$$AMT = IMT \times r \quad (L)$$

Having set the higher and lower limits, the materiality continuum can be expressed mathematically as follows:

$$IMT \geq AMT \geq IMT \times r \quad (M_1)$$

The materiality continuum can be expressed in four additional forms. From equation (2), we know that IMT is equal to TC. Therefore, the materiality continuum can be rewritten as follows:

$$TC \geq AMT \geq TC \times r \quad (M_2)$$

Since total transaction cost (TC) is equal to the product of total transaction cost percentage (TC%) and market value, the materiality continuum can take the following form:

$$TC\% \times MV \geq AMT \geq TC\% \times MV \times r \quad (M_3)$$

By substituting MV with  $(E / r)$  the above form of the materiality continuum can be expressed in terms of CAPM earnings (E) as follows:

$$TC\% \times (E / r) \geq AMT \geq TC\% \times (E / r) \times r$$

$$(TC\% / r) \times E \geq AMT \geq TC\% \times E \quad (M_4)$$

By combining the left side of  $M_3$  with the right side of  $M_4$ , the materiality continuum can be expressed in terms of the transaction cost percentage (TC%):

$$TC\% \times MV \geq AMT \geq TC\% \times E \quad (M_5)$$

Assume that the total transaction cost is 0.5 percent of market value ( $TC\% = .5\%$ ) and that the required or normal rate of return (r) corresponding to the systematic risk (beta) of a particular company is 10%. Using  $M_3$  to calculate the materiality continuum of the company, the materiality

threshold can range from 0.5% to 0.05% of the company's market value. Alternatively, if we use  $M_4$ , the range can be described as being between 5% and 0.5% of CAPM earnings. This range would change if the company's beta were different because the rate of return would also be different. For example, had the beta been large enough to a 12% rate of return, the materiality threshold would range from 4.2% to 0.5% of CAPM earnings or from 0.5% to 0.06% of market value. In terms of CAPM earnings, the higher percentage limit only has changed, but in terms of market value the lower percentage limit only has changed. Either way, the materiality continuum has decreased. The materiality continuum will decrease as beta and the required rate of return increase and vice versa.

The beta and the market value of a company are the two fundamental pieces of information necessary to implement the CAPM approach to materiality.

Section 8  
Empirical Study

I have collected information pertaining to the market value, beta, total assets, net sales, and net income of 30 companies (see table 1 of appendix C) from "disclosure worldscope global" compact disc data storage of January 1993. These data have been used to compute four traditional materiality standards and one based on the CAPM approach (see table 2 of appendix C). The traditional materiality standards are: 1) 0.5% of total assets, 2) 0.5% of net sales, 3) 5% of net income, and 4) Peat Marwick audit gauge ( $1.6 \times$  [the greater of total assets or net sales]<sup>2/3</sup>). The other materiality standard exemplifies the CAPM approach and is a simple variation of the third traditional standard -- 5% of CAPM earnings. The calculation of CAPM earnings involves two steps. In the first step, the required rate of return of each company is calculated using the following formula:

$$r = (7.5\% \times \text{beta}) + 4.9\%$$

The above formula expresses the relationship between systematic risk (beta) and return depicted in appendix B. The second step involves the multiplication of the rate of return calculated in the first step with the market value. The product of these terms is the CAPM earnings.

There are differences in the materiality thresholds from one standard to another. To make these differences more comparable, the materiality thresholds have been transformed into percentages of market value (see table 3 of appendix C). As a common denominator, market value serves as the yardstick for comparing both the relative magnitude and the stability of the five materiality standards. Market value is a theoretically appropriate and a logical comparative basis since it has been shown that the materiality continuum can be expressed in terms of market value.

Table 4 of appendix C depicts some statistical results of the materiality threshold percentages. Two of these statistical measures are of particular interest and therefore are further analyzed in table 5 of appendix C. The first important statistical measure is the average or mean which denotes the average magnitude of each materiality standard. Total assets has the largest magnitude (2.24% of market value), net sales has a lower magnitude of 0.80%, CAPM earnings has a magnitude of 0.59%, net income has a magnitude of 0.39%, and audit gauge has the lowest magnitude (0.35%).

The second important statistical measure is the coefficient of variation (standard deviation / mean) which indicates the relative stability of the materiality standards. The CAPM standard is the most stable with a coefficient of variation of 0.34. Net income, net sales, and audit gauge have



coefficients of variation of 0.68, 0.77, and 0.95 respectively. Total assets has a very high coefficient of variation of 1.47.

The magnitude and stability rankings indicate that two of the traditional standards (net income and audit gauge) have average magnitudes that are lower than that of the CAPM standard, but none of the traditional standard has the stability of the CAPM standard. The coefficient of CAPM earnings is half the coefficient of net income, which is the most stable traditional standard. Since CAPM earnings is the most stable standard and the magnitude of CAPM earnings can be controlled by adjusting its materiality percentage, CAPM earnings may be preferred base for computing materiality.

Appendix C includes data with respect to five companies that had negative net income (ie. losses) and one that had extremely low net income. These abnormalities may distort the statistical results of net income. Theoretically, CAPM earnings is a surrogate for normal net income and therefore, in the absence of abnormalities in net income, the net income standard should approximate the CAPM standard. In order to test this statistically, the analysis of appendix C was reperformed in appendix D, omitting the data of the aforementioned six companies.

The statistical results of Appendix D show that, in the absence of extreme abnormalities in net income, the net income

standard has a coefficient of variation of 0.31, which is very close to that of CAPM earnings (0.34). Not only the stability of net income, but also the stability of the other three traditional standards have been significantly improved in appendix D. Negative income seems to impact market value but not total assets, and as a result, the "normal" relationship between total assets and market value is distorted. The coefficient of variation of the total assets standard has decreased from 1.47 in appendix C to 0.88 in appendix D; a 40.1% improvement. Net sales has improved from 0.77 to 0.51 (33.7%). Audit gauge, which is based usually on total assets rather than net sales, has shown great improvement (49.5%) from 0.95 to 0.48.

The above improvements indicate that all traditional materiality standards suffer from abnormalities in net income. For this reason, the rest of our analysis will exclude these abnormalities recognizing that the CAPM approach is clearly superior to traditional standards in the presence of these abnormalities.

Total assets is the least stable standard. Traditionally, one of the most desirable characteristics of total assets as a materiality base is its stability. The traditional definition of stability relates to materiality thresholds that do not vary widely from one period to another. My definition of stability relates to materiality thresholds that do not

vary widely as percentages of market value. The former definition can be characterized as "inter-period stability" and the latter definition can be called "market value stability" or "inter-company stability".

Inter-company stability is theoretically superior to inter-period stability. Specifically, there is a positive relationship between AMT and IMT. Also IMT is equal to total transaction cost (TC) which is positively related to market value. Consequently, there is a positive relationship between AMT and market value.

The CAPM standard is the most stable one, and its stability is not affected by abnormal actual earnings. This strong inter-company stability is a fundamental advantage of the CAPM approach over other standards. With respect to magnitude, the CAPM standard has a less conservative average magnitude compared to net income and audit gauge, but this can be adjusted by changing the materiality percentage used. For example, if we use a CAPM materiality percentage of 3.5% instead of 5%, the average magnitude of the CAPM standard (0.34%) will be almost identical to that of net income of appendix D (0.36%) and exactly identical to that of audit gauge of appendix C (0.35%). This is illustrated in appendix E. The 3.5% of CAPM earnings standard has the same stability as the 5% of CAPM earnings standard and the average magnitude of the 5% of net income standard, which is the most widely

used of the traditional standards.

Appendix E includes another refinement of the CAPM approach which illustrates that perfect market value stability can be achieved (see table 5 of appendix E). By using  $(TC\% / r)$  as the CAPM materiality percentage, the CAPM approach reduces to a simple percentage of market value, which in turn can be reduced to total transaction costs (TC) as follows:

$$\begin{aligned} \text{AMT} &= (TC\% / r) \times E \\ &= (TC\% / r) \times (r \times MV) \\ &= TC\% \times MV \\ &= (TC / MV) \times MV \\ &= TC \end{aligned}$$

The above special case of the CAPM approach amounts precisely to the higher limit of the materiality continuum (i.e.,  $\text{AMT} = \text{IMT} = \text{TC}$ ). Since the assumption underlying the higher limit is that materiality impacts the transitory component of earnings only, no CAPM capitalization based on CAPM rate of return ( $r$ ) is involved and consequently materiality is solely dependent on market value. If, however, materiality is assumed to impact directly the permanent component of earnings, the portion of materiality representing permanent earnings is capitalizable using the rate of return corresponding to the company's beta. Therefore, the material amount is dependent on both market value and beta with respect to any point of the materiality continuum other than the

higher limit. This dependency on beta is why the CAPM approach usually involves a slight market value instability. The less than perfect market value stability attributed to beta is necessary when capitalization of permanent earnings is involved (called normal market value instability).

The magnitude of the normal market value instability is two-dimensional. The first dimension determines the possible range of normal market value instability based on the relationship between risk and return. The primary consideration is the slope of CAPM, or in other words, the magnitude of the market risk premium. As the slope becomes steeper, the normal market value instability will increase. On the other hand, if the market risk premium decreases, the market value instability will also decrease. This positive relationship between market risk premium and the magnitude of the normal market value instability is illustrated in Appendix F. The same CAPM standard (i.e., 3.5% of CAPM earnings) is implemented based on three different assumptions of the magnitude of the market risk premium. These assumptions are graphically depicted in Appendix I. Note that the assumption which places the market risk premium at 7.5% is the same one depicted separately in Appendix B and used in the analysis of Appendices C through E. The other two assumptions involve slopes different from that of Appendix B.

One assumption is that the risk-free rate of return is

5.9% ( $\beta = 0$ ) and market rate of return is 12.4% ( $\beta = 1$ ). Therefore, there is a market risk premium of 6.5% ( $12.4\% - 5.9\%$ ) and a slope of 6.5 (6.5 percentage points divided by a  $\beta$  of 1). The other assumption is that the risk-free rate of return is 4.0% and the market return is 14%, rendering a market risk premium of 10% and a slope of 10.

The statistical results of Appendix F show that the CAPM standard with a slope of 6.5 has a coefficient of variation of 0.28, which is smaller than that of the CAPM standard with a slope of 7.5 (0.34). On the other hand, the CAPM standard with the steepest slope (10) has the largest coefficient of variation (0.41). Net income has better stability than CAPM earnings when the slope of CAPM is assumed to be 7.5% or higher. However, according to Brigham and Gapenski (1991) the observed ex post market risk premium of 7.5% probably overstates the "true" ex ante market risk premium. As a result, the ex ante risk-free rate would probably be higher than the ex post rate of 4.9%. If, for example, the risk-free rate were 5.9% instead of 4.9%, the coefficient of variation of CAPM earnings would be 0.28, which is less than that of net income (see Appendix F). In essence, the stability of the ex ante CAPM would probably be almost identical to net income.

The second dimension of the magnitude of normal market value instability determines the exact point within the possible range specified by the first dimension. The exact

point depends on the extent to which materiality is capitalized (see Appendix G). At one extreme, if materiality represents solely a misstatement of temporary earnings, the normal market value instability will be zero because materiality reduces to a simple percentage of market value (see  $M_5$ ). At the other extreme, if materiality impacts permanent earnings only, the normal market value instability will be at the maximum of the range (0.34). If materiality impacts 75% transitory earnings and 25% permanent earnings, the coefficient of variation will be 0.01 only. If the impact is 50% on transitory earnings (H) and 50% on permanent earnings (L), the coefficient of variation will be 0.03. If the impact on transitory earnings is 25% and the impact on permanent earnings is 75%, the coefficient of variation will be 0.08.

The statistical results in Appendix G indicate that the standard deviations of the various points within the materiality continuum range from zero to 0.01% of market value, rendering insignificantly low coefficients of variation (standard deviation / average) for all points except those that are extremely close to the lower limit of the continuum. As a result, the normal market value instability can be assumed to be zero for all points in the continuum except for those that are very low and assume full capitalization of

materiality. If I assume that the average magnitude of the net income standard of Appendices D through F approximates the true materiality threshold, and therefore indicates the correct extent of the capitalization of CAPM earnings, the average magnitude of the CAPM earnings should be approximately 0.35% of market value, which is the higher limit. Appendix H reperforms the analysis of Appendix G and assumes a transaction cost percentage of 0.5% instead of 0.35%. The point within the materiality continuum that corresponds to the magnitude of net income is somewhere between the middle of the continuum and the higher limit, indicating once again that a simple percentage of market value (i.e., 0.35%) would be a sufficiently accurate standard.

In general, the normal market value instability becomes significant only when the magnitude of the materiality threshold is ten times less than the average magnitude of the net income standard. Even if the true magnitude of the materiality threshold were 0.5% of net income, instead of the assumed 5% of net income, such a low materiality threshold would be impossible to implement in practice because it would render the audit prohibitively costly. As a result, for all practical purposes, the CAPM approach to materiality can be reduced to a simple percentage of market value, where the percentage is equal to or less than the low transaction cost percentage applicable to large investors.



## Section 9

### Conclusion

This paper has introduced a finance or investors' approach to materiality. In the sixth section, I proposed that normal economic or CAPM earnings be used as the materiality base instead of an accounting materiality base such as net income, net sales, or total assets. The advantage of CAPM earnings over traditional materiality bases is that it provides superior relevance and stability. Superior relevance is derived from the fact that investors are more sensitive to expected long-term economic earnings rather than current net income. At the same time, CAPM earnings possesses more traditional stability than net income since CAPM earnings do not suffer from the abnormalities of actual net income and also possess more market value stability than the other traditional standards.

In the seventh section, I developed a comprehensive theoretical materiality framework to provide guidance in the determination of the materiality percentage to be used in conjunction with CAPM earnings. The framework, which is depicted in Appendix J, shows that there are three levels of materiality: 1) The accounting materiality threshold (AMT) which is applied to accounting earnings, 2) the economic materiality threshold (EMT) which is based on economic

earnings, and 3) the investment materiality threshold (IMT) which is derived from market value. IMT was shown to be simply a certain percentage of market value that amounts to a theoretical total transaction cost. The link between IMT and EMT is the CAPM model which facilitates the capitalization of earnings into market value. The link between EMT and AMT is accounting policies that create differences between accounting and economic earnings. However, I assumed that accounting earnings is equal to economic earnings and therefore, EMT was assumed to be equal to AMT. The theoretical framework culminated in the construction of a materiality continuum which delineates the range of possible materiality thresholds.

In the eighth section, an empirical study was presented, illustrating that the implementation of the CAPM approach is practically feasible and indeed very desirable. Also, it was shown that the CAPM approach can be reduced to a simple percentage of market value (0.35%) which approximates the average magnitude of the net income and audit gauge standards as well as the higher limit of the materiality continuum.

There are two limitations in the implementation of the CAPM approach which can be viewed as opportunities for future research: 1) The assumption that accounting and economic earnings are identical, and 2) the assumption that the average magnitudes of the net income and audit gauge standards reflect the true magnitude of materiality. The second assumption

presents the greatest opportunity for future research, because if it were empirically shown that materiality constitutes a permanent component of earnings as opposed to a transitory component, the true accounting materiality threshold would be about ten times smaller than the average materiality thresholds of the leading and most conservative traditional standards.

The highest acceptable materiality threshold under the CAPM approach is the lowest acceptable materiality threshold in practice (5% of net income) which means that acceptance of the theory presented in this paper can indeed eliminate the wide variability of materiality thresholds using traditional standards and thereby achieve a significant degree of uniformity and objectivity. I hope that researchers will adopt and build on the CAPM approach in an effort to accomplish the understanding and objectivity that the fundamental concept of materiality deserves.

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## Appendix A

Table 1

The relative importance placed on various Materiality Bases by subjects as reported by empirical studies

Base: Study:	Materiality	Earn- ings	Earn- ings Trend	Net As- sets	Total As- sets	Other
Woolsey, 1954a		1st				
Woolsey, 1954b		1st				2nd
Boatsman & Robertson, 1974		1st	3rd		3rd	2nd
Moriarity & Barron, 1976		1st	2nd		3rd	
Ward, 1976		1st				
Hofstedt & Hughes, 1977		1st				2nd
Firth, 1979 (U.K.)		1st		2nd	4th	3rd

## Appendix A

Table 2

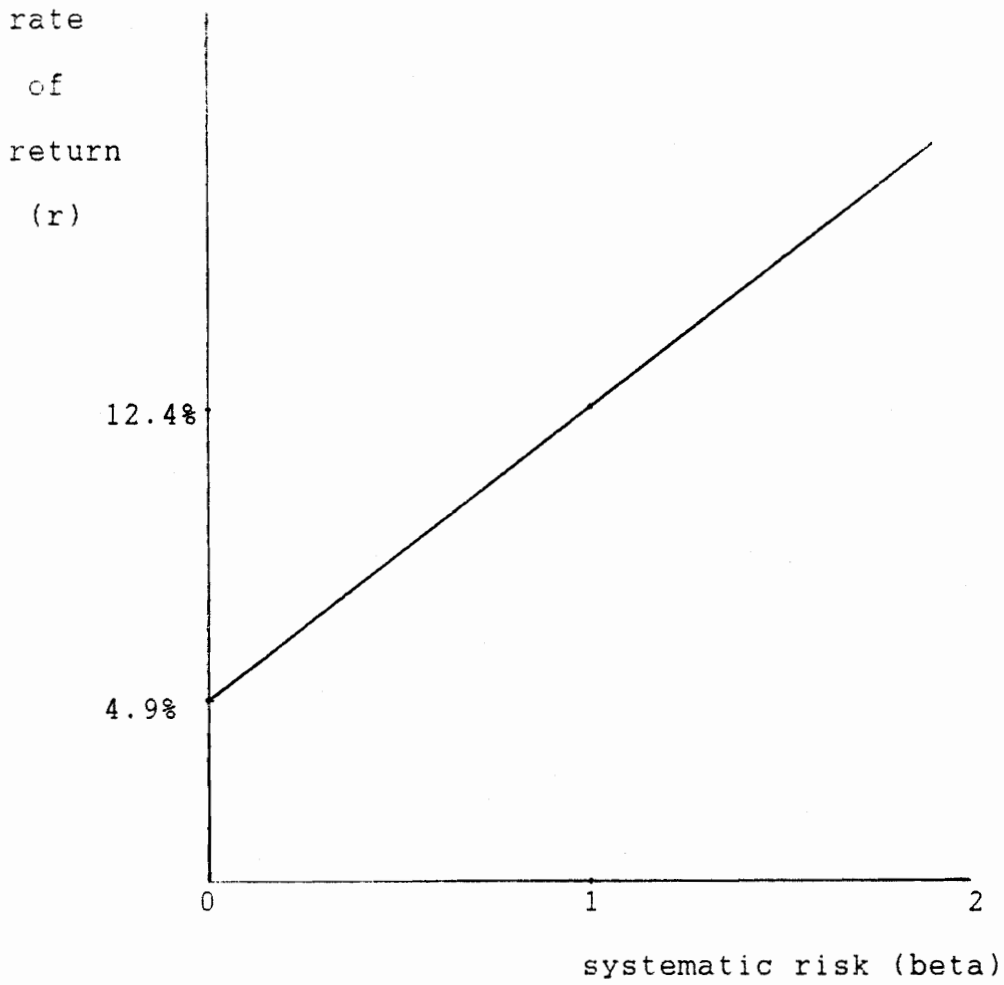
Materiality Percentages in relation to earnings suggested by groups or individuals based on (descriptive) study results or other research (both normative and descriptive)

Study:	Materiality Percentage
Woolsey, 1954a	5% to 15%
Neumann, 1968	5% to 10%
Boatsman & Robertson, 1974	4%
Committee on Corporate Reporting of the Financial Executives Institute, 1975*	5%
AICPA (Task Force on Materiality), 1975*	5%
Financial Analysts Federation, 1975*	2% to 5%
Stringer, 1982	6.4%
Jennings, Kneer, and Reckers, 1987	4% to 18%

Note that the asterisk (\*) denotes that the information was derived from Stringer (1982).

Appendix B

The Capital Asset Pricing Model





# Appendix C

## Table 1

### Company Data

Ticker Symbol	Market Value (\$000s)	Total Assets (\$000s)	Net Sales (\$000s)	Net Income (\$000s)	Beta
AR	881,703	2,937,414	1,909,922	45,957	0.68
BRG	17,729,318	47,036,666	16,592,641	1,604,894	1.25
CRS	418,374	714,752	570,200	16,122	0.70
CTX	976,777	2,347,452	2,165,707	34,557	1.80
CMH	1,142,523	554,780	371,179	39,343	1.14
CDO	844,904	5,006,000	2,174,000	69,000	1.15
CYM	892,914	1,965,682	1,656,517	42,744	0.87
DUK	7,164,495	10,470,615	3,816,960	583,623	0.37
FSR	1,474,801	12,309,453	1,254,214	134,331	1.12
GM	18,175,614	184,325,500	122,081,400	(4,452,800)	0.85
GP	4,687,951	10,622,000	11,524,000	(142,000)	1.30
IDA	976,839	1,773,674	483,193	57,872	0.67
IEI	378,994	556,008	672,502	24,761	-0.16
LOR	1,466,894	2,658,565	2,881,820	121,795	0.73
LUC	334,172	432,360	628,774	22,996	1.02
ML	2,947,031	3,896,873	6,075,415	313,149	0.84
NCC	2,261,786	24,169,746	2,587,937	230,967	1.38
NVP	638,900	1,410,022	538,775	35,176	0.32
OLN	767,662	2,012,000	2,275,000	(13,000)	1.22
PPW	6,585,171	13,228,800	4,007,000	507,200	0.40
PD	2,332,349	3,051,138	2,434,262	272,900	0.82
POM	2,777,645	5,853,792	1,697,123	210,164	0.57
PA	4,277,137	21,560,800	6,608,200	478,800	2.14
SNC	673,108	22,815,520	2,267,071	(170,644)	1.65
SRP	606,385	1,368,882	468,766	46,307	0.33
SAJ	136,125	170,893	89,580	9,790	0.52
SUP	316,310	271,001	273,490	18,220	1.13
TXU	8,796,741	18,792,782	4,893,173	(288,361)	0.37
WGL	688,082	1,013,921	697,875	46,396	0.21
WFC	3,016,098	53,547,000	5,861,000	21,000	1.90

## Appendix C

### Table 2

#### Materiality Thresholds (\$000s)

Ticker Symbol	CAPM EARNINGS 5%	Total Assets 0.5%	Net Sales 0.5%	Net Income 5%	Peat Marwick Gauge
AR	4.409	14,687	9,550	2,298	3.282
BRG	126.543	235,183	82,963	80,245	20.849
CRS	2,123	3,574	2,851	806	1.279
CTX	8,986	11,737	10,829	1,728	2.826
CMH	7,683	2,774	1,856	1,967	1,080
CDO	5,714	25,030	10,870	3,450	4.682
CYM	5,101	9,828	8,283	2,137	2.511
DUK	27,494	52,353	19,085	29,181	7.658
FSR	9,807	61,547	6,271	6,717	8,530
GM	102,465	921,628	610,407	222,640	51.822
GP	34,339	53,110	57,620	7,100	8.163
IDA	4,848	8,868	2,416	2,894	2.344
IEI	701	2,780	3,363	1,238	1,228
LOR	7.610	13,293	14,409	6,090	3.240
LUC	2,097	2,162	3,144	1,150	1,174
ML	16.503	19,484	30,377	15,657	5.327
NCC	17.246	120,849	12,940	11,548	13,375
NVP	2,332	7,050	2,694	1,759	2,012
OLN	5,393	10,060	11,375	650	2,768
PPW	26.011	66,144	20,035	25,360	8.950
PD	12.886	15,256	12,171	13,645	3.366
POM	12.742	29,269	8,486	10,508	5,197
PA	44.803	107,804	33,041	23,940	12,395
SNC	5.814	114,078	11,335	8,532	12,871
SRP	2,236	6,844	2,344	2,315	1,973
SAJ	599	854	448	490	493
SUP	2,115	1,355	1,367	911	674
TXU	33.757	93,964	24,466	14,418	11,310
WGL	2,228	5,070	3,489	2,320	1,615
WFC	28.879	267,735	29,305	1,050	22,731

## Appendix C

### Table 3

Materiality Thresholds as a Percentage of Market Value

Ticker Symbol	CAPM EARNINGS 5%	Total Assets 0.5%	Net Sales 0.5%	Net Income 5%	Peat Marwick Gauge
AR	0.50%	1.67%	1.08%	0.26%	0.37%
BRG	0.71%	1.33%	0.47%	0.45%	0.12%
CRS	0.51%	0.85%	0.68%	0.19%	0.31%
CTX	0.92%	1.20%	1.11%	0.18%	0.29%
CMH	0.67%	0.24%	0.16%	0.17%	0.09%
CDO	0.68%	2.96%	1.29%	0.41%	0.55%
CYM	0.57%	1.10%	0.93%	0.24%	0.28%
DUK	0.38%	0.73%	0.27%	0.41%	0.11%
FSR	0.67%	4.17%	0.43%	0.46%	0.58%
GM	0.56%	5.07%	3.36%	1.22%	0.29%
GP	0.73%	1.13%	1.23%	0.15%	0.17%
IDA	0.50%	0.91%	0.25%	0.30%	0.24%
IEI	0.19%	0.73%	0.89%	0.33%	0.32%
LOR	0.52%	0.91%	0.98%	0.42%	0.22%
LUC	0.63%	0.65%	0.94%	0.34%	0.35%
ML	0.56%	0.66%	1.03%	0.53%	0.18%
NCC	0.76%	5.34%	0.57%	0.51%	0.59%
NVP	0.37%	1.10%	0.42%	0.28%	0.31%
OLN	0.70%	1.31%	1.48%	0.08%	0.36%
PPW	0.40%	1.00%	0.30%	0.39%	0.14%
PD	0.55%	0.65%	0.52%	0.59%	0.14%
POM	0.46%	1.05%	0.31%	0.38%	0.19%
PA	1.05%	2.52%	0.77%	0.56%	0.29%
SNC	0.86%	16.95%	1.68%	1.27%	1.91%
SRP	0.37%	1.13%	0.39%	0.38%	0.33%
SAJ	0.44%	0.63%	0.33%	0.36%	0.36%
SUP	0.67%	0.43%	0.43%	0.29%	0.21%
TXU	0.38%	1.07%	0.28%	0.16%	0.13%
WGL	0.32%	0.74%	0.51%	0.34%	0.23%
WFC	0.26%	8.88%	0.97%	0.03%	0.75%

Appendix C

Table 4

Statistical Results of Materiality Standards as a  
Percentage of Market Value

	CAPM EARNINGS 5%	Total Assets 0.5%	Net Sales 0.5%	Net Income 5%	Peat Marwick Gauge
MINIMUM	0.19%	0.24%	0.16%	0.03%	0.09%
MAXIMUM	1.05%	16.95%	3.36%	1.27%	1.91%
AVERAGE	0.59%	2.24%	0.80%	0.39%	0.35%
STANDARD DEVIATION	0.20%	3.29%	0.62%	0.27%	0.33%
VARIANCE	0.0004%	0.1082%	0.0038%	0.0007%	0.0011%
COEFFICIENT OF VARIATION	0.34	1.47	0.77	0.68	0.95

Appendix C

Table 5

Rankings of Magnitude and Stability

MAGNITUDE			STABILITY	
NO.	STANDARD	AVERAGE	STANDARD	COEFFICIENT OF VARIATION
1	Audit Gauge	0.35%	CAPM Earnings	0.34
2	Net Income	0.39%	Net Income	0.68
3	CAPM Earnings	0.59%	Net Sales	0.77
4	Net Sales	0.80%	Audit Gauge	0.95
5	Total Assets	2.24%	Total Assets	1.47

Appendix D

Table 1

Company Data

Ticker Symbol	Market Value (\$000s)	Total Assets (\$000s)	Net Sales (\$000s)	Net Income (\$000s)	Beta
AR	881,703	2,937,414	1,909,922	45,957	0.68
BRG	17,729,318	47,036,666	16,592,641	1,604,894	1.25
CRS	418,374	714,752	570,200	16,122	0.70
CTX	976,777	2,347,452	2,165,707	34,557	1.80
CMH	1,142,523	554,780	371,179	39,343	1.14
CDO	844,904	5,006,000	2,174,000	69,000	1.15
CYM	892,914	1,965,682	1,656,517	42,744	0.87
DUK	7,164,495	10,470,615	3,816,960	583,623	0.37
FSR	1,474,801	12,309,453	1,254,214	134,331	1.12
IDA	976,839	1,773,674	483,193	57,872	0.67
IEI	378,994	556,008	672,502	24,761	-0.16
LOR	1,466,894	2,658,565	2,881,820	121,795	0.73
LUC	334,172	432,360	628,774	22,996	1.02
ML	2,947,031	3,896,873	6,075,415	313,149	0.84
NCC	2,261,786	24,169,746	2,587,937	230,967	1.38
NVP	638,900	1,410,022	538,775	35,176	0.32
PPW	6,585,171	13,228,800	4,007,000	507,200	0.40
PD	2,332,349	3,051,138	2,434,262	272,900	0.82
POM	2,777,645	5,853,792	1,697,123	210,164	0.57
PA	4,277,137	21,560,800	6,608,200	478,800	2.14
SRP	606,385	1,368,882	468,766	46,307	0.33
SAJ	136,125	170,893	89,580	9,790	0.52
SUP	316,310	271,001	273,490	18,220	1.13
WGL	688,082	1,013,921	697,875	46,396	0.21

Appendix D

Table 2

Materiality Thresholds (\$000s)

Ticker Symbol	CAPM EARNINGS 5%	Total Assets 0.5%	Net Sales 0.5%	Net Income 5%	Peat Marwick Gauge
AR	4,409	14,687	9,550	2,298	3.282
BRG	126,543	235,183	82,963	80,245	20.849
CRS	2,123	3,574	2,851	806	1.279
CTX	8,986	11,737	10,829	1,728	2.826
CMH	7,683	2,774	1,856	1,967	1.080
CDO	5,714	25,030	10,870	3,450	4.682
CYM	5,101	9,828	8,283	2,137	2.511
DUK	27,494	52,353	19,085	29,181	7.658
FSR	9,807	61,547	6,271	6,717	8.530
IDA	4,848	8,868	2,416	2,894	2.344
IEI	701	2,780	3,363	1,238	1.228
LOR	7,610	13,293	14,409	6,090	3.240
LUC	2,097	2,162	3,144	1,150	1.174
ML	16,503	19,484	30,377	15,657	5.327
NCC	17,246	120,849	12,940	11,548	13.375
NVP	2,332	7,050	2,694	1,759	2.012
PPW	26,011	66,144	20,035	25,360	8.950
PD	12,886	15,256	12,171	13,645	3.366
POM	12,742	29,269	8,486	10,508	5.197
PA	44,803	107,804	33,041	23,940	12.395
SRP	2,236	6,844	2,344	2,315	1.973
SAJ	599	854	448	490	493
SUP	2,115	1,355	1,367	911	674
WGL	2,228	5,070	3,489	2,320	1.615

Appendix D

Table 3

Materiality Thresholds as a Percentage of Market Value

Ticker Symbol	CAPM EARNINGS 5%	Total Assets 0.5%	Net Sales 0.5%	Net Income 5%	Peat Marwick Gauge
AR	0.50%	1.67%	1.08%	0.26%	0.37%
BRG	0.71%	1.33%	0.47%	0.45%	0.12%
CRS	0.51%	0.85%	0.68%	0.19%	0.31%
CTX	0.92%	1.20%	1.11%	0.18%	0.29%
CMH	0.67%	0.24%	0.16%	0.17%	0.09%
CDO	0.68%	2.96%	1.29%	0.41%	0.55%
CYM	0.57%	1.10%	0.93%	0.24%	0.28%
DUK	0.38%	0.73%	0.27%	0.41%	0.11%
FSR	0.67%	4.17%	0.43%	0.46%	0.58%
IDA	0.50%	0.91%	0.25%	0.30%	0.24%
IEI	0.19%	0.73%	0.89%	0.33%	0.32%
LOR	0.52%	0.91%	0.98%	0.42%	0.22%
LUC	0.63%	0.65%	0.94%	0.34%	0.35%
ML	0.56%	0.66%	1.03%	0.53%	0.18%
NCC	0.76%	5.34%	0.57%	0.51%	0.59%
NVP	0.37%	1.10%	0.42%	0.28%	0.31%
PPW	0.40%	1.00%	0.30%	0.39%	0.14%
PD	0.55%	0.65%	0.52%	0.59%	0.14%
POM	0.46%	1.05%	0.31%	0.38%	0.19%
PA	1.05%	2.52%	0.77%	0.56%	0.29%
SRP	0.37%	1.13%	0.39%	0.38%	0.33%
SAJ	0.44%	0.63%	0.33%	0.36%	0.36%
SUP	0.67%	0.43%	0.43%	0.29%	0.21%
WGL	0.32%	0.74%	0.51%	0.34%	0.23%



Appendix D

Table 4

Statistical Results of Materiality Standards as a  
Percentage of Market Value

	CAPM EARNINGS 5%	Total Assets 0.5%	Net Sales 0.5%	Net Income 5%	Peat Marwick Gauge
MINIMUM	0.19%	0.24%	0.16%	0.17%	0.09%
MAXIMUM	1.05%	5.34%	1.29%	0.59%	0.59%
AVERAGE	0.56%	1.36%	0.63%	0.36%	0.28%
STANDARD DEVIATION	0.19%	1.19%	0.32%	0.11%	0.14%
VARIANCE	0.0004%	0.0143%	0.0010%	0.0001%	0.0002%
COEFFICIENT OF VARIATION	0.34	0.88	0.51	0.31	0.48

Appendix D

Table 5

Rankings of Magnitude and Stability

MAGNITUDE			STABILITY	
NO.	STANDARD	AVERAGE	STANDARD	COEFFICIENT OF VARIATION
1	Audit Gauge	0.28%	Net Income	0.31
2	Net Income	0.36%	CAPM Earnings	0.34
3	CAPM Earnings	0.56%	Audit Gauge	0.48
4	Net Sales	0.63%	Net Sales	0.51
5	Total Assets	1.36%	Total Assets	0.88

Appendix E

Table 1

Company Data

Ticker Symbol	Market Value (\$000s)	Total Assets (\$000s)	Net Sales (\$000s)	Net Income (\$000s)	Beta
AR	881.703	2,937,414	1,909,922	45,957	0.68
BRG	17,729,318	47,036,666	16,592,641	1,604,894	1.25
CRS	418.374	714,752	570,200	16,122	0.70
CTX	976,777	2,347,452	2,165,707	34,557	1.80
CMH	1,142,523	554,780	371,179	39,343	1.14
CDO	844,904	5,006,000	2,174,000	69,000	1.15
CYM	892,914	1,965,682	1,656,517	42,744	0.87
DUK	7,164,495	10,470,615	3,816,960	583,623	0.37
FSR	1,474,801	12,309,453	1,254,214	134,331	1.12
IDA	976,839	1,773,674	483,193	57,872	0.67
IEI	378,994	556,008	672,502	24,761	-0.16
LOR	1,466,894	2,658,565	2,881,820	121,795	0.73
LUC	334,172	432,360	628,774	22,996	1.02
ML	2,947,031	3,896,873	6,075,415	313,149	0.84
NCC	2,261,786	24,169,746	2,587,937	230,967	1.38
NVP	638,900	1,410,022	538,775	35,176	0.32
PPW	6,585,171	13,228,800	4,007,000	507,200	0.40
PD	2,332,349	3,051,138	2,434,262	272,900	0.82
POM	2,777,645	5,853,792	1,697,123	210,164	0.57
PA	4,277,137	21,560,800	6,608,200	478,800	2.14
SRF	606,385	1,368,882	468,766	46,307	0.33
SAJ	136,125	170,893	89,580	9,790	0.52
SUP	316,310	271,001	273,490	18,220	1.13
WGL	688,082	1,013,921	697,875	46,396	0.21

## Appendix E

### Table 2

#### Materiality Thresholds (\$000s)

Ticker Symbol	CAPM EARNINGS 5%	CAPM EARNINGS 3.5%	CAPM EARNINGS 0.35% / r	Net Income 5%	Peat Marwick Gauge
AR	4,409	3,086	3,086	2,298	3,282
BRG	126,543	88,580	62,053	80,245	20,849
CRS	2,123	1,486	1,464	806	1,279
CTX	8,986	6,290	3,419	1,728	2,826
CMH	7,683	5,378	3,999	1,967	1,080
CDO	5,714	4,000	2,957	3,450	4,682
CYM	5,101	3,571	3,125	2,137	2,511
DUK	27,494	19,246	25,076	29,181	7,658
FSR	9,807	6,865	5,162	6,717	8,530
IDA	4,848	3,393	3,419	2,894	2,344
IEI	701	491	1,326	1,238	1,228
LOR	7,610	5,327	5,134	6,090	3,240
LUC	2,097	1,468	1,170	1,150	1,174
ML	16,503	11,552	10,315	15,657	5,327
NCC	17,246	12,072	7,916	11,548	13,375
NVP	2,332	1,632	2,236	1,759	2,012
PPW	26,011	18,208	23,048	25,360	8,950
PD	12,886	9,020	8,163	13,645	3,366
POM	12,742	8,920	9,722	10,508	5,197
PA	44,803	31,362	14,970	23,940	12,395
SRP	2,236	1,565	2,122	2,315	1,973
SAJ	599	419	476	490	493
SUP	2,115	1,481	1,107	911	674
WGL	2,228	1,559	2,408	2,320	1,615

## Appendix E

### Table 3

Materiality Thresholds as a Percentage of Market Value

Ticker Symbol	CAPM EARNINGS 5%	CAPM EARNINGS 3.5%	CAPM EARNINGS 0.35% / r	Net Income 5%	Peat Marwick Gauge
AR	0.50%	0.35%	0.35%	0.26%	0.37%
BRG	0.71%	0.50%	0.35%	0.45%	0.12%
CRS	0.51%	0.36%	0.35%	0.19%	0.31%
CTX	0.92%	0.64%	0.35%	0.18%	0.29%
CMH	0.67%	0.47%	0.35%	0.17%	0.09%
CDO	0.68%	0.47%	0.35%	0.41%	0.55%
CYM	0.57%	0.40%	0.35%	0.24%	0.28%
DUK	0.38%	0.27%	0.35%	0.41%	0.11%
FSR	0.67%	0.47%	0.35%	0.46%	0.58%
IDA	0.50%	0.35%	0.35%	0.30%	0.24%
IEI	0.19%	0.13%	0.35%	0.33%	0.32%
LOR	0.52%	0.36%	0.35%	0.42%	0.22%
LUC	0.63%	0.44%	0.35%	0.34%	0.35%
ML	0.56%	0.39%	0.35%	0.53%	0.18%
NCC	0.76%	0.53%	0.35%	0.51%	0.59%
NVP	0.37%	0.26%	0.35%	0.28%	0.31%
PPW	0.40%	0.28%	0.35%	0.39%	0.14%
PD	0.55%	0.39%	0.35%	0.59%	0.14%
POM	0.46%	0.32%	0.35%	0.38%	0.19%
PA	1.05%	0.73%	0.35%	0.56%	0.29%
SRP	0.37%	0.26%	0.35%	0.38%	0.33%
SAJ	0.44%	0.31%	0.35%	0.36%	0.36%
SUP	0.67%	0.47%	0.35%	0.29%	0.21%
WGL	0.32%	0.23%	0.35%	0.34%	0.23%

Appendix E

Table 4

Statistical Results of Materiality Standards as a  
Percentage of Market Value

	CAPM EARNINGS 5%	CAPM EARNINGS 3.5%	CAPM EARNINGS 0.35% / r	Net Income 5%	Peat Marwick Gauge
MINIMUM	0.19%	0.13%	0.35%	0.17%	0.09%
MAXIMUM	1.05%	0.73%	0.35%	0.59%	0.59%
AVERAGE	0.56%	0.39%	0.35%	0.36%	0.28%
STANDARD DEVIATION	0.19%	0.13%	0.00%	0.11%	0.14%
VARIANCE	0.0004%	0.0002%	0.0000%	0.0001%	0.0002%
COEFFICIENT OF VARIATION	0.34	0.34	0.00	0.31	0.48

Appendix E

Table 5

Rankings of Magnitude and Stability

MAGNITUDE			STABILITY	
NO.	STANDARD	AVERAGE	STANDARD	COEFFICIENT OF VARIATION
1	Audit Gauge	0.28%	CAPM 0.35% / r	0.00
2	CAPM 0.35% / r	0.35%	Net Income	0.31
3	Net Income	0.36%	CAPM 3.5%	0.34
4	CAPM 3.5%	0.39%	CAPM 5%	0.34
5	CAPM 5%	0.56%	Audit Gauge	0.48

Appendix F

Table 1

Company Data

Ticker Symbol	Market Value (\$000s)	Total Assets (\$000s)	Net Sales (\$000s)	Net Income (\$000s)	Beta
AR	881,703	2,937,414	1,909,922	45,957	0.68
BRG	17,729,318	47,036,666	16,592,641	1,604,894	1.25
CRS	418,374	714,752	570,200	16,122	0.70
CTX	976,777	2,347,452	2,165,707	34,557	1.80
CMH	1,142,523	554,780	371,179	39,343	1.14
CDO	844,904	5,006,000	2,174,000	69,000	1.15
CYM	892,914	1,965,682	1,656,517	42,744	0.87
DUK	7,164,495	10,470,615	3,816,960	583,623	0.37
FSR	1,474,801	12,309,453	1,254,214	134,331	1.12
IDA	976,839	1,773,674	483,193	57,872	0.67
IEI	378,994	556,008	672,502	24,761	-0.16
LOR	1,466,894	2,658,565	2,881,820	121,795	0.73
LUC	334,172	432,360	628,774	22,996	1.02
ML	2,947,031	3,896,873	6,075,415	313,149	0.84
NCC	2,261,786	24,169,746	2,587,937	230,967	1.38
NVP	638,900	1,410,022	538,775	35,176	0.32
PPW	6,585,171	13,228,800	4,007,000	507,200	0.40
PD	2,332,349	3,051,138	2,434,262	272,900	0.82
POM	2,777,645	5,853,792	1,697,123	210,164	0.57
PA	4,277,137	21,560,800	6,608,200	478,800	2.14
SRP	606,385	1,338,882	468,766	46,307	0.33
SAJ	136,125	170,893	89,580	9,790	0.52
SUP	316,310	271,001	273,490	18,220	1.13
WGL	688,082	1,013,921	697,875	46,396	0.21



## Appendix F

### Table 2

#### Materiality Thresholds (\$000s)

Ticker Symbol	CAPM EARNINGS 3.5% Slope=6.5	CAPM EARNINGS 3.5% Slope=7.5	CAPM EARNINGS 3.5% Slope=10	Net Income 5%	Peat Marwick Gauge
AR	3,080	3,086	3,333	2,298	3,282
BRG	83,151	88,580	102,387	80,245	20,849
CRS	1,479	1,486	1,611	806	1,279
CTX	5,709	6,290	7,521	1,728	2,826
CMH	5,095	5,378	6,158	1,967	1,080
CDO	3,785	4,000	4,584	3,450	4,682
CYM	3,475	3,571	3,969	2,137	2,511
DUK	20,361	19,246	19,308	29,181	7,658
FSR	6,514	6,865	7,846	6,717	8,530
IDA	3,392	3,393	3,658	2,894	2,344
IEI	655	491	318	1,238	1,228
LOR	5,278	5,327	5,802	6,090	3,240
LUC	1,406	1,468	1,661	1,150	1,174
ML	11,284	11,552	12,790	15,657	5,327
NCC	11,225	12,072	14,091	11,548	13,375
NVP	1,749	1,632	1,610	1,759	2,012
PPW	19,130	18,208	18,438	25,360	8,950
PD	8,833	9,020	9,959	13,645	3,366
POM	9,061	8,920	9,430	10,508	5,197
PA	28,054	31,362	38,024	23,940	12,395
SRP	1,672	1,565	1,549	2,315	1,973
SAJ	430	419	438	490	493
SUP	1,404	1,481	1,694	911	674
WGL	1,724	1,559	1,469	2,320	1,615

## Appendix F

### Table 3

Materiality Thresholds as a Percentage of Market Value

Ticker Symbol	CAPM EARNINGS 3.5% Slope=6.5	CAPM EARNINGS 3.5% Slope=7.5	CAPM EARNINGS 3.5% Slope=10	Net Income 5%	Peat Marwick Gauge
AR	0.35%	0.35%	0.38%	0.26%	0.37%
BRG	0.47%	0.50%	0.58%	0.45%	0.12%
CRS	0.35%	0.36%	0.39%	0.19%	0.31%
CTX	0.58%	0.64%	0.77%	0.18%	0.29%
CMH	0.45%	0.47%	0.54%	0.17%	0.09%
CDO	0.45%	0.47%	0.54%	0.41%	0.55%
CYM	0.39%	0.40%	0.44%	0.24%	0.28%
DUK	0.28%	0.27%	0.27%	0.41%	0.11%
FSR	0.44%	0.47%	0.53%	0.46%	0.58%
IDA	0.35%	0.35%	0.37%	0.30%	0.24%
IEI	0.17%	0.13%	0.08%	0.33%	0.32%
LOR	0.36%	0.36%	0.40%	0.42%	0.22%
LUC	0.42%	0.44%	0.50%	0.34%	0.35%
ML	0.38%	0.39%	0.43%	0.53%	0.18%
NCC	0.50%	0.53%	0.62%	0.51%	0.59%
NVP	0.27%	0.26%	0.25%	0.28%	0.31%
PPW	0.29%	0.28%	0.28%	0.39%	0.14%
PD	0.38%	0.39%	0.43%	0.59%	0.14%
POM	0.33%	0.32%	0.34%	0.38%	0.19%
PA	0.66%	0.73%	0.89%	0.56%	0.29%
SRP	0.28%	0.26%	0.26%	0.38%	0.33%
SAJ	0.32%	0.31%	0.32%	0.36%	0.36%
SUP	0.44%	0.47%	0.54%	0.29%	0.21%
WGL	0.25%	0.23%	0.21%	0.34%	0.23%

Appendix F

Table 4

Statistical Results of Materiality Standards as a  
Percentage of Market Value

	CAPM EARNINGS 3.5% Slope=6.5	CAPM EARNINGS 3.5% Slope=7.5	CAPM EARNINGS 3.5% Slope=10	Net Income 5%	Peat Marwick Gauge
MINIMUM	0.17%	0.13%	0.08%	0.17%	0.09%
MAXIMUM	0.66%	0.73%	0.89%	0.59%	0.59%
AVERAGE	0.38%	0.39%	0.43%	0.36%	0.28%
STANDARD DEVIATION	0.11%	0.13%	0.18%	0.11%	0.14%
VARIANCE	0.0001%	0.0002%	0.0003%	0.0001%	0.0002%
COEFFICIENT OF VARIATION	0.28	0.34	0.41	0.31	0.48

Appendix F

Table 5

Rankings of Magnitude and Stability

NO.	MAGNITUDE		STABILITY		COEFFICIENT OF VARIATION
	STANDARD	AVERAGE	STANDARD		
1	Audit Gauge	0.28%	CAPM 3.5%, 6.5		0.28
2	Net Income	0.36%	Net Income		0.31
3	CAPM 3.5%, 6.5	0.38%	CAPM 3.5%, 7.5		0.34
4	CAPM 3.5%, 7.5	0.39%	CAPM 3.5%, 10		0.41
5	CAPM 3.5%, 10	0.43%	Audit Gauge		0.48

# Appendix G

## Table 1

### Materiality Continuum

Ticker Symbol	Market Value (\$000s)	CAPM Earnings (\$000s)	Market Value 0.35% (\$000s)	CAPM Earnings 0.35% (\$000s)	Beta
AR	881,703	88,170	3,086	309	0.68
BRG	17,729,318	2,530,860	62,053	8,858	1.25
CRS	418,374	42,465	1,464	149	0.70
CTX	976,777	179,727	3,419	629	1.80
CMH	1,142,523	153,669	3,999	538	1.14
CDO	844,904	114,273	2,957	400	1.15
CYM	892,914	102,015	3,125	357	0.87
DUK	7,164,495	549,875	25,076	1,925	0.37
FSR	1,474,801	196,149	5,162	687	1.12
IDA	976,839	96,951	3,419	339	0.67
IEI	378,994	14,023	1,326	49	-0.16
LOR	1,466,894	152,190	5,134	533	0.73
LUC	334,172	41,939	1,170	147	1.02
ML	2,947,031	330,067	10,315	1,155	0.84
NCC	2,261,786	344,922	7,916	1,207	1.38
NVP	638,900	46,640	2,236	163	0.32
PPW	6,585,171	520,229	23,048	1,821	0.40
PD	2,332,349	257,725	8,163	902	0.82
POM	2,777,645	254,849	9,722	892	0.57
PA	4,277,137	896,060	14,970	3,136	2.14
SRP	606,385	44,721	2,122	157	0.33
SAJ	136,125	11,979	476	42	0.52
SUP	316,310	42,306	1,107	148	1.13
WGL	688,082	44,553	2,408	156	0.21

## Appendix G

### Table 2

#### Five Points of the Materiality Continuum

Ticker Symbol	HIGHER (H)			LOWER (L)	
	Market Value 0.35%	75%H+25%L	50%H+50%L	25%H+75%L	CAPM Earnings 0.35%
AR	3,086	2,392	1,697	1,003	309
BRG	62,053	48,754	35,455	22,157	8,858
CRS	1,464	1,135	806	478	149
CTX	3,419	2,721	2,024	1,326	629
CMH	3,999	3,134	2,268	1,403	538
CDO	2,957	2,318	1,679	1,039	400
CYM	3,125	2,433	1,741	1,049	357
DUK	25,076	19,288	13,500	7,712	1,925
FSR	5,162	4,043	2,924	1,805	687
IDA	3,419	2,649	1,879	1,109	339
IEI	1,326	1,007	688	368	49
LOR	5,134	3,984	2,833	1,683	533
LUC	1,170	914	658	402	147
ML	10,315	8,025	5,735	3,445	1,155
NCC	7,916	6,239	4,562	2,884	1,207
NVP	2,236	1,718	1,200	681	163
PPW	23,048	17,741	12,434	7,128	1,821
PD	8,163	6,348	4,533	2,717	902
POM	9,722	7,514	5,307	3,099	892
PA	14,970	12,012	9,053	6,095	3,136
SRP	2,122	1,631	1,139	648	157
SAJ	476	368	259	151	42
SUP	1,107	867	628	388	148
WGL	2,408	1,845	1,282	719	156

## Appendix G

### Table 3

Materiality Continuum Points Expressed in  
Percentages of Market Value

Ticker Symbol	HIGHER (H)				LOWER (L)
	Market Value 0.35%	75%H+25%L	50%H+50%L	25%H+75%L	CAPM Earnings 0.35%
AR	0.35%	0.27%	0.19%	0.11%	0.04%
BRG	0.35%	0.27%	0.20%	0.12%	0.05%
CRS	0.35%	0.27%	0.19%	0.11%	0.04%
CTX	0.35%	0.28%	0.21%	0.14%	0.06%
CMH	0.35%	0.27%	0.20%	0.12%	0.05%
CDO	0.35%	0.27%	0.20%	0.12%	0.05%
CYM	0.35%	0.27%	0.19%	0.12%	0.04%
DUK	0.35%	0.27%	0.19%	0.11%	0.03%
FSR	0.35%	0.27%	0.20%	0.12%	0.05%
IDA	0.35%	0.27%	0.19%	0.11%	0.03%
IEI	0.35%	0.27%	0.18%	0.10%	0.01%
LOR	0.35%	0.27%	0.19%	0.11%	0.04%
LUC	0.35%	0.27%	0.20%	0.12%	0.04%
ML	0.35%	0.27%	0.19%	0.12%	0.04%
NCC	0.35%	0.28%	0.20%	0.13%	0.05%
NVP	0.35%	0.27%	0.19%	0.11%	0.03%
PPW	0.35%	0.27%	0.19%	0.11%	0.03%
PD	0.35%	0.27%	0.19%	0.12%	0.04%
POM	0.35%	0.27%	0.19%	0.11%	0.03%
PA	0.35%	0.28%	0.21%	0.14%	0.07%
SRF	0.35%	0.27%	0.19%	0.11%	0.03%
SAJ	0.35%	0.27%	0.19%	0.11%	0.03%
SUP	0.35%	0.27%	0.20%	0.12%	0.05%
WGL	0.35%	0.27%	0.19%	0.10%	0.02%

Appendix G

Table 4

Statistical Results of Materiality Continuum Points  
Expressed in Percentages of Market Value

	HIGHER (H				LOWER (L)
	Market Value 0.35%	75%H+25%L	50%H+50%L	25%H+75%L	CAPM Earnings 0.35%
MINIMUM	0.35%	0.27%	0.18%	0.10%	0.01%
MAXIMUM	0.35%	0.28%	0.21%	0.14%	0.07%
AVERAGE	0.35%	0.27%	0.19%	0.12%	0.04%
STANDARD DEVIATION	0.00%	0.00%	0.01%	0.01%	0.01%
VARIANCE	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
COEFFICIENT OF VARIATION	0.00	0.01	0.03	0.08	0.34



## Appendix H

### Table 1

#### Materiality Continuum

Ticker Symbol	Market Value (\$000s)	CAPM Earnings (\$000s)	Market Value 0.50% (\$000s)	CAPM Earnings 0.50% (\$000s)	Beta
AR	881,703	88,170	4,409	441	0.68
BRG	17,729,318	2,530,860	88,647	12,654	1.25
CRS	418,374	42,465	2,092	212	0.70
CTX	976,777	179,727	4,884	899	1.80
CMH	1,142,523	153,669	5,713	768	1.14
CDO	844,904	114,273	4,225	571	1.15
CYM	892,914	102,015	4,465	510	0.87
DUK	7,164,495	549,875	35,822	2,749	0.37
FSR	1,474,801	196,149	7,374	981	1.12
IDA	976,839	96,951	4,884	485	0.67
IEI	378,994	14,023	1,895	70	-0.16
LOR	1,466,894	152,190	7,334	761	0.73
LUC	334,172	41,939	1,671	210	1.02
ML	2,947,031	330,067	14,735	1,650	0.84
NCC	2,261,786	344,922	11,309	1,725	1.38
NVP	638,900	46,640	3,195	233	0.32
PPW	6,585,171	520,229	32,926	2,601	0.40
PD	2,332,349	257,725	11,662	1,289	0.82
POM	2,777,645	254,849	13,888	1,274	0.57
PA	4,277,137	896,060	21,386	4,480	2.14
SRP	606,385	44,721	3,032	224	0.33
SAJ	136,125	11,979	681	60	0.52
SUP	316,310	42,306	1,582	212	1.13
WGL	688,082	44,553	3,440	223	0.21

## Appendix H

### Table 2

#### Five Points of the Materiality Continuum

Ticker Symbol	HIGHER (H)				LOWER (L)
	Market Value 0.50%	75%H+25%L	50%H+50%L	25%H+75%L	CAPM Earnings 0.50%
AR	4,409	3,417	2,425	1,433	441
BRG	88,647	69,649	50,650	31,652	12,654
CRS	2,092	1,622	1,152	682	212
CTX	4,884	3,888	2,891	1,895	899
CMH	5,713	4,477	3,240	2,004	768
CDO	4,225	3,311	2,398	1,485	571
CYM	4,465	3,476	2,487	1,499	510
DUK	35,822	27,554	19,286	11,018	2,749
FSR	7,374	5,776	4,177	2,579	981
IDA	4,884	3,784	2,684	1,585	485
IEI	1,895	1,439	983	526	70
LOR	7,334	5,691	4,048	2,404	761
LUC	1,671	1,306	940	575	210
ML	14,735	11,464	8,193	4,922	1,650
NCC	11,309	8,913	6,517	4,121	1,725
NVP	3,195	2,454	1,714	974	233
PPW	32,926	25,345	17,763	10,182	2,601
PD	11,662	9,068	6,475	3,882	1,289
POM	13,888	10,735	7,581	4,428	1,274
PA	21,386	17,159	12,933	8,707	4,480
SRP	3,032	2,330	1,628	926	224
SAJ	681	525	370	215	60
SUP	1,582	1,239	897	554	212
WGL	3,440	2,636	1,832	1,027	223

## Appendix H

### Table 3

Materiality Continuum Points Expressed in  
Percentages of Market Value

Ticker Symbol	HIGHER (H)			LOWER (L)	
	Market Value 0.50%	75%H+25%L	50%H+50%L	25%H+75%L	CAPM Earnings 0.50%
AR	0.50%	0.39%	0.28%	0.16%	0.05%
BRG	0.50%	0.39%	0.29%	0.18%	0.07%
CRS	0.50%	0.39%	0.28%	0.16%	0.05%
CTX	0.50%	0.40%	0.30%	0.19%	0.09%
CMH	0.50%	0.39%	0.28%	0.18%	0.07%
CDO	0.50%	0.39%	0.28%	0.18%	0.07%
CYM	0.50%	0.39%	0.28%	0.17%	0.06%
DUK	0.50%	0.38%	0.27%	0.15%	0.04%
FSR	0.50%	0.39%	0.28%	0.17%	0.07%
IDA	0.50%	0.39%	0.27%	0.16%	0.05%
IEI	0.50%	0.38%	0.26%	0.14%	0.02%
LOR	0.50%	0.39%	0.28%	0.16%	0.05%
LUC	0.50%	0.39%	0.28%	0.17%	0.06%
ML	0.50%	0.39%	0.28%	0.17%	0.06%
NCC	0.50%	0.39%	0.29%	0.18%	0.08%
NVP	0.50%	0.38%	0.27%	0.15%	0.04%
PPW	0.50%	0.38%	0.27%	0.15%	0.04%
PD	0.50%	0.39%	0.28%	0.17%	0.06%
POM	0.50%	0.39%	0.27%	0.16%	0.05%
PA	0.50%	0.40%	0.30%	0.20%	0.10%
SRP	0.50%	0.38%	0.27%	0.15%	0.04%
SAJ	0.50%	0.39%	0.27%	0.16%	0.04%
SUP	0.50%	0.39%	0.28%	0.18%	0.07%
WGL	0.50%	0.38%	0.27%	0.15%	0.03%

Appendix H

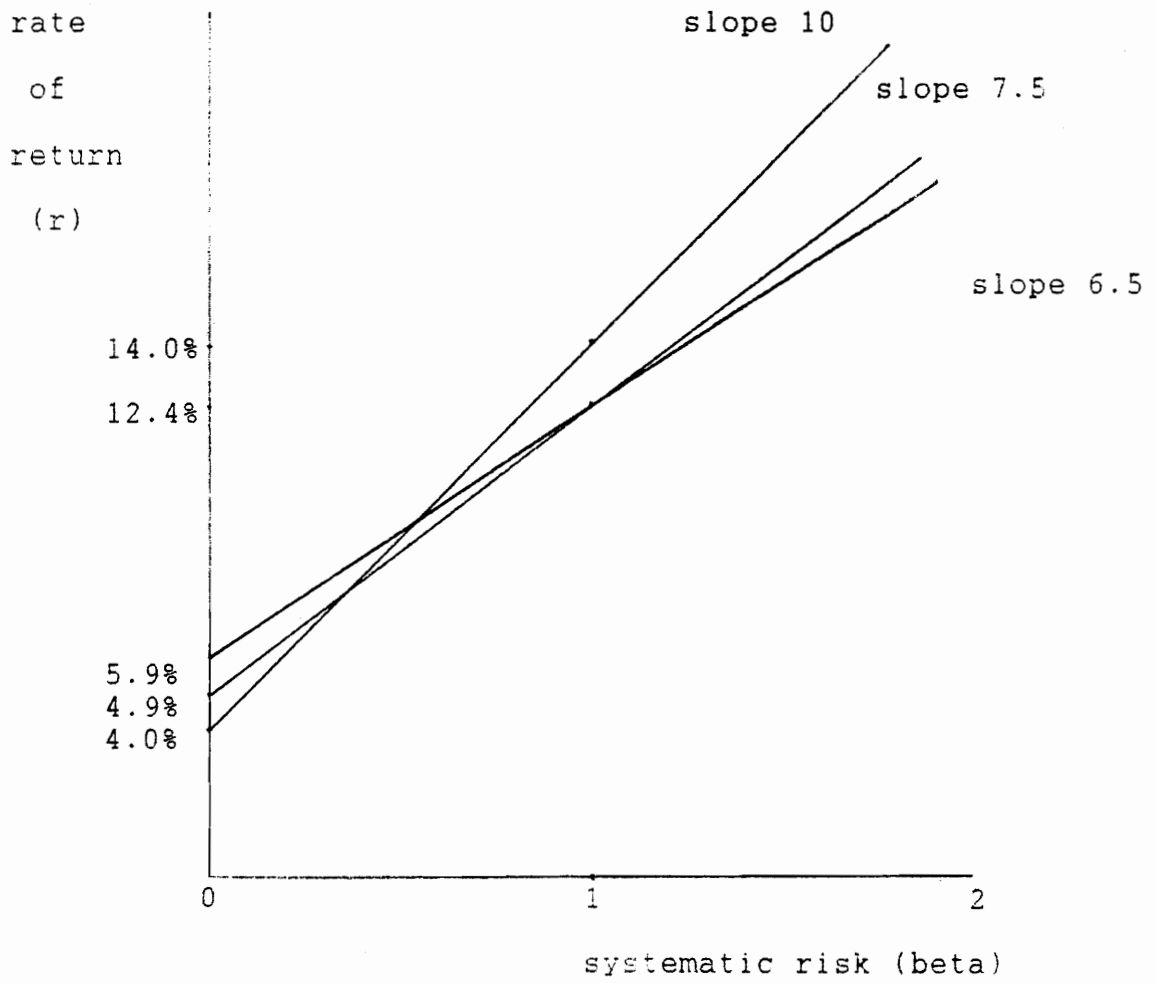
Table 4

Statistical Results of Materiality Continuum Points  
Expressed in Percentages of Market Value

	HIGHER (H	LOWER (L)			
	Market Value 0.50%	75%H+25%L	50%H+50%L	25%H+75%L	CAPM Earnings 0.50%
MINIMUM	0.50%	0.38%	0.26%	0.14%	0.02%
MAXIMUM	0.50%	0.40%	0.30%	0.20%	0.10%
AVERAGE	0.50%	0.39%	0.28%	0.17%	0.06%
STANDARD DEVIATION	0.00%	0.00%	0.01%	0.01%	0.02%
VARIANCE	0.0000%	0.0000%	0.0000%	0.0000%	0.0000%
COEFFICIENT OF VARIATION	0.00	0.01	0.03	0.08	0.34

Appendix I

The Capital Asset Pricing Model Under Various Slopes



## Appendix J

### Theoretical Framework

				Market Value	--	IMT
Transitory Economic Earnings	+	Permanent Economic Earnings	=	Economic Earnings	--	EMT
Transitory Impact of Policies	+	Permanent Impact of Policies	=	Accounting Policies		
Transitory Accounting Earnings	+	Permanent Accounting Earnings	=	Accounting Earnings	--	AMT

## Vita

### Education

Bachelor in Business Administration, Cyprus College,  
Nicosia, Cyprus, Summer 1991.

### Experience

Auditing trainee, Rotsas & Co., Nicosia, Cyprus,  
Summer 1991.

Second Lieutenant, National Guard of Cyprus, Nicosia,  
Cyprus, July 1987 to December 1989.

*Georgios  
Gervasi*