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Intangible Assets and Value Relevance of Accounting Information of Listed High-Tech Firms in Nigeria

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Abstract
Accounting has been developed overtime in response to the needs of users of financial statements for information relevant to support economic decisions and judgments. During industrial era this prime role of accounting was discharged accordingly. However, in this information era, firms particularly high-technology firms are operating on intangible assets and some of them are not recognized by the accounting system. This is in spite of their critical role in enhancing the value of firms, together with the major role of accounting in providing information relevant for economic decisions. Therefore, there is a great concern that the absence of some of these intangible assets on the balance sheets have led to the deterioration of the quality of accounting information. As evident in the wide gap between market values and book values of equity, and the decline in the value relevance of accounting information, which is usually attributed to the absence of some of intangible assets in the balance sheets. However, it is argued that intangible assets lack reliability due to their accruals nature. Therefore, this study is aimed at assessing the joint incremental value relevance of intangibles assets, brands, not recognized in the current accounting practice. The study also explores the contribution of these assets towards improving the informative quality of accounting information to the users; and assesses the reliability of reporting intangible as assets. Using a sample of nine high-technology firms during the period of seven years (2005-2011), the study employed Ordinary Least Square Regression technique for data analysis using Edward, Bells and Ohlson Price model. We found that, there is joint incremental value relevance of recognizing intangible assets in the statement of financial positions of High-Technology firms in Nigeria at 99% confidence level. That is, recognizing intangible assets, brand in this case in the statement of financial position of listed high-technology firms in Nigeria will increase the quality of accounting information of the firms. Similarly, the study found that intangible assets are value relevance and reliable. We recommend amongst others that, IAS 38 should be broadened to include brand assets.
Keywords: Intangible Assets, Brand Assets, Value Relevance, Accounting Information Quality

1.1 Introduction

The dynamic nature of the environment in which accounting operates makes human being developed different methods of wealth-creation in each emerged environment through time. These environments according to Lamberg (2004) include agriculture, industrial and information era; each wealth-creation method was served with appropriate accounting model in order to produce relevant accounting information for economic decisions. He further opined that during agricultural era, accounting provides the necessary infrastructure for providing relevant accounting information. Accounting also responded to industrial revolution by providing a model based on entity theory to measure and communicate economic activities of enterprises. However, in the information era, financial statements that have been prepared under Generally Accepted Accounting Principles (GAAP) are designed to describe the industrial era enterprise; the enterprise that creates wealth by using more of tangible assets.

While the dominant assets on the industrial era enterprises are those tangible assets, intangible assets dominate the information era enterprises. These assets include; the capacity of innovation, Research and Development (R&D), Human resource, information and technical know-how, brand equity, good relations with customers and vendors as well as with employees. These intangible assets drive post-industrial era firms, and most of them are not on the balance sheet (Elliott, 1998). In essence accounting has not adequately responded to the shift in mode of production from industrial era to the information era.

Consequently, the conventional accounting model served the industrial era well, but is not enough for informing the ability of knowledge-based era firms to create future value. And hence, knowledge-based era firms create value through assets that lack physical substance. Elliott (1998) asserts that even industrial era enterprises are no longer strictly tangible-assets companies, similarly, Nakamura (2003) provides evidence that investment in intangible assets is roughly equal to the total investments of the United State of America's (USA) manufacturing sector in tangible assets. He added that intangible investments, especially those that enable firms to innovate, brings in returns that are much higher than costs of capital and the returns of fixed assets investments even in traditional industries. This revealed that intangible assets possess one of the criteria

(relevance) for assets recognition in the balance sheets. Hence, the major aim and objective of financial accounting is to provide users of financial statements with useful information for the purposes of efficient economic decision. This view is in line with Financial Accounting Standard Board (FASB) that financial accounting should provide information that is useful to present and potential investors and creditors, and other users in making rational investment, credit and similar decisions. Consequently, any event that is likely to affect a firm's current financial position or its future performance should be reflected in its financial statements.

Apparently, the success of a firm in this information era is largely depended on continuous innovation and focus on customer, thus, firms have to invest in two aspects of intangible; that is, innovation and adaptation capabilities (Human resources and R&D); and customer attraction (brands and relationship building: advertising, marketing, distribution and promotional activities) in order to strengthen the firm's competitive position and ensure their future viability (Lev & Daum, 2004). According to Goldfinger (1997), the source of economic value and wealth is more than the production of material goods, but the creation and manipulation of intangible assets. As a result, there is a growing need by firms to make investments in intangible assets, and in most cases are not reflected in the balance sheet. As such the information content of financial statements is declining as well as the quality of accounting information. According to Shehu (2012), to achieve the quality of understandability, the financial statements should contain full disclosure and higher level of transparency. He further states that, corporate transparency is the widespread availability of relevant and reliable information about the periodic performance. He concludes that, the quality of financial reporting is to promote transparency and deliver high quality Annual Report through comprehensive disclosure.

The absence of most intangible assets on the balance sheet makes financial statements becoming less informative on the firm's current financial position and future prospects (Lev & Zarowin, 1998). They added that increasing gap between the market value and the book value of equity is an indication of loss of relevance of accounting information (earnings and book value of equities) which is attributed to the absent of intangible assets on the balance sheets. As a result of this, a substantial number of academicians, practitioners, Chief Executive Officers and regulators call for the reform of conventional accounting system to recognize intangible assets in the balance sheets because of their value relevance to investors. However, in this study we argue that, does the recognition of intangibles as assets in the balance sheets improve the quality of accounting information beyond that of conventional accounting?

On the other hand, opponents of reporting intangible assets claim that they are uncertain (i.e. unreliable) despite their role as value driven assets in the information era. Thus, reliability is one of the two primary qualities of accounting information recognized by the Statement of Financial Accounting Concept Number 2 (SFAC No. 2), where it states that reliability and relevance are the two primary qualities of accounting information that is useful for economic decision-making. Bello (2009) is of the view that reliability-focus alone lead to unrealistic income number, while Stewart (1991), Lev (2001) and Abubakar (2010) argue that relevance criterion should always come first before reliability in financial reporting, because reporting reliable irrelevant information is meaningless and conflicts with the objective of financial reporting. In a more practical defense of intangible assets reporting, Barth, Beaver, and Landsman (2000) establish that value relevance tests are joint tests of relevance and reliability. However, recent studies that document a decline in the value relevance of earnings and book values of equity (Lev & Zarowin, 1999; Francis & Schipper, 1999; Core, Guay & Van, 2003) attributed the decrease in the value relevance to the failure of conservative accounting rules to recognize most of the value driven intangible assets like R&D and Advertising expenditures in the balance sheets (Balachandra & Mohanram, 2010).

Accounting has been developed overtime in response to the needs of users of financial statements for financial information relevant to support economic decisions and informed judgments. The major benefit of releasing high quality information by firms is that, it reduces information asymmetries and thus, reduces firm's cost of capital. Similarly, it facilitates capital allocation in the stock market and firm valuation. During industrial era this prime role of accounting was discharged successfully. However, in this information era, firms particularly high-technology firms are operating on intangible assets (like, R&D, Brands, Technical Know-how, among others) and some of them have not been recognized by accounting system. This is in-spite the fact that some of the intangibles have met the recognition criteria set out in the IAS 38, and the ultimate objective of financial accounting that is, the provision of information relevant to present and potential investors, creditors, and other users for rational economic decisions. Based on this objective, any item that is likely to affect firm's current financial position or its future performance for over one accounting period should be recognized as asset in the balance sheet.

Therefore, the essence of financial statements is to communicate to users of accounting information the true and fair operating performance, during a specified period and the financial position at the end of the period. However, the expensing of some of the intangibles as required by the IAS 38 in the income statement distorts the truth and fairness of the operating performance and the financial position as well. Thus, misleading and as such firms in the information-era are understating their earnings and income tax liability, as well as reporting biased

book values. In addition, this may result in inefficiencies in the allocation of resources in the capital market and high cost of capital to the firms. There is however, a great concern since early 1990s by the Regulators, Practitioners, Academia and other Stakeholders, that the absence of some of these intangibles on the balance sheets has led to the deterioration of the quality of accounting information as evident in the wide increasing gap between the book values and market values of the firms in this new economy era. Another evidence of the loss of quality of accounting information is the decline in the value relevance of the accounting information.

In view of the above problems, two major arguments emerged in the literature and within the Regulators and Standard-Setters. The first argument relates to the value relevance of those intangibles, that whether recognizing them as assets will improve the quality of accounting information via value relevance; while, the second argument is in respect of the reliability of those intangibles. Given the fact that intangible-intensive or high-technology firms are on increase in Nigeria, where the treatment of some of the intangibles is expensing rather than capitalizing, there is need to study the value relevance and reliability of those intangibles when they are reported as assets in the balance sheets.

This study is motivated by the increasing role of intangible assets in value creation especially to high-technology firms in the present day new economy, together with the increasing rate of emergence of technology companies in both developed and developing economies whose value comprised of significant amount of knowledge-based resources that lack physical substance (intangibles). Similarly, the failure of International Accounting Standard (IAS 38) to recognized most of the valuable intangible assets like R&D, and brand equity, motivated the study. Which as a result, conventional accounting information is now less relevant in the sense that financial statements numbers (earnings and book values) are less related to security prices. One major effects of a loss in value relevance of accounting information is the increasing gap between market values and book values of equity which could not be explained with the contemporary earnings growth rate, but is partially due to the facts that investors started to value the increasing level of investments in intangible assets as a means of future value drivers and competitive advantage (Nakamura 1999). Additionally, academics, professionals and regulators express their concerns over the erosion of relevance of reported earnings information, and historical traditional accounting in general, due to the fast changes in the environment and the economy as well. Hence, recognizing more assets will improve transparency and communication with the stakeholders which can increase confidence of investors.

This study is expected to contribute to existing body of knowledge in three ways; one, it will highlight the value relevance of accounting information if intangible assets are expensed and when intangible assets are recognized as assets in the balance sheets; two, it will explore whether or not reporting intangibles in the balance sheets as assets could increase the quality of accounting information; and lastly, the study will show whether intangible assets measurement and reporting is reliable in a sample of high-technology firms in Nigeria. The main objective of the study, however, is to assess the joint incremental value relevance of reporting intangibles (brand) as assets in the financial statements of high-technology firms in Nigeria. Other objective is to assess the reliability of measurement and reporting intangibles as assets in the financial statements of High-technology firms in Nigeria.

In consistent with the problem and objectives of this study, the following hypotheses are formulated in null form:

$H_{01:}$ There is no joint incremental value relevance of capitalizing intangible assets in the financial statements of High-technology firms in Nigeria.

$H_{02:}$ There is no significant reliability in capitalizing intangible assets in the financial statements of High-technology firms in Nigeria.

The study is restricted to identifiable internally generated intangible assets (brand assets) of listed High-tech firms in Nigeria. High technology firms are purported to be intangible intensive firms with a wide gap between market values and book values of equity, which the extant literature attributed to the absent of intangible assets on their balance sheets. They are therefore, defined in the context of this work as all those firms that are pervasive and highly innovative, with significant investments in information technology, marketing and distribution, advertisement and promotional activities. The study covers the period from 2005 to 2011.

The rest of the paper is structured as follows: conceptual literature on intangible assets and value relevance of accounting information, empirical literature, theoretical framework, research methodology, study population and sample size, technique of data analysis and model specification, results and discussions, conclusion and recommendations, references, and appendices.

1.1 Review of Related Literature

1.2 Conceptual Literature

Assets are defined by SFAC No.6 and IAS 38 as the probable future economic benefits controlled by and accruing to a particular entity as a result of past transactions or events. This definition identifies ownership and ability to generate future economic benefits as attribute of assets. Canibano, Coversi and Sanchez (2000) argue

that whenever those probable future economic benefits lack physical form, they should be recognized as intangible assets. On the other hand, assets according to IFRS 16 are materials used by the enterprise in production, goods delivery, provision of services, leasing out or administrative purposes, and are intended for use over several accounting period. The standard also states that for an asset to be recognized as asset, a probability that any future economic benefits associated with the use of the asset will flow into the enterprise; and the value of an asset can be reliably measured.

On the other hand, Stickney and Weil (1994) defined intangible assets as assets which can provide future benefits without having physical form. According to them intangible assets meet one of the attributes of asset (ability to generate future economic benefits). Belkaoui (1992) sees intangible assets as those assets which lack a physical substance, but result from legal or contractual rights and are likely to produce future benefits to a firm. In this definition intangible assets are classified into identifiable (like patents and brand name) and unidentifiable (like goodwill). In similar vein, Organization for Economic Cooperation and Development (OECD) in 1992 suggested that intangible investments cover all long-term outlays by firms aimed at increasing future performance other than by the purchase of fixed assets. In another effort Hendriksen and Breda (1992) provide a logical and practical view of intangible assets as assets that arise when cash (or its equivalent) is expended on services. This definition includes services such as advertisement and promotional activities as intangible assets.

Intangible assets according to IASB are defined in IAS 38, as non-monetary assets without physical substance held for use in the production or supply of goods or services for rental to others, or for administrative purposes, that; (a) are identifiable; (b) are controlled by an enterprise as a result of past events; and (c) from which future economic benefits are expected to flow to the enterprises. This definition according to Canibano *et al.* (2000) is considered as restrictive and disappointing, as it out rightly excludes from the scope of the standard and thus, does not consider some of the firm's most significant intangible investments, such as resource allocated to human resources and advertising or branding.

On the other hand, over two decade economists have been stressing the intangible capital aspect of advertising expenditure with respect to brand image building. According to this view, Lester (1961) (cited in Hirschey 1982) states that "…brands and continuous advertising is needed to maintain a given rate of sales and, therefore, advertising expenditures can be viewed as a capital good that depreciate over time and needs maintenance and repair. According to Aaker in Ferdinand (2008), brand is "a set of assets and liabilities linked to a brand's name and symbol that adds to or subtracts from the value provided by a product or service to a firm and/or that firm's customers." This definition sees brand as a value generating assets as a result of name and symbol from a product of a company. Brand is seen by Leuthesser (1995) as a product's additional value (for its customers) compared with what would be the value for another identical product without the brands".

Kotler and Keller (2009) define the brand as a products or services whose dimensions differentiate it in some way from other products or services designed to satisfy the same need. This definition is precise and consistent with the operational role of brand, and as such this is the conceptualization considered in this study. Perhaps, it is all about creating differences between products from which marketers need to educate consumers who the product is, what the product does and why consumers should care. The proponents of brand capitalization points out that a firm's brands are often its important assets more important than the buildings, machine and motor vehicles whose values is included in the accounts Fernandez (2008). Moreover, Saiz and Fernandez (2009) state that brand plays a critical role both in industrial and knowledge-based era, which include provision of information on origin and quality. They further state that, brand is an essential tool for manufacturers setting out to conquer local and Global markets, because it allows consumers to consistently identify one or several products with a specific manufacturer and region and therefore, create an image of quality and competitiveness.

Therefore, if marketing expenditure is treated as an expense then, is an incomplete representation of the marketing contribution; thus, advertising concerned with long-term demand creation and can be viewed as creating marketing asset. As such, researchers indicate that advertising increases brand awareness, provide information about quality and increase customer satisfaction (Fornell, Mithas, Morgeson, Krishnan 2006, & Fernandez, 2008). One of the methods of brand valuation proposed in the literature according to Fernandez (2008) is the brand's replacement value, which is the present value of the historic investment in marketing and promotions or estimation of the advertising investment required to achieve the present level of brand recognition.

In support of brand capitalization, Artsberg and Mehtiyeva (2010) state that, the location where Ipod was physically made somehow is not that important to its customers; it is the great design, technical innovation and 'brand recognition' of apple that the market priced the Ipod. And, this brand image together with the innovation and unique design has helped apple computer sell more than 40 million Ipods in 2005 alone. Yet the published data such as financial statements do not count what apple spends on R&D and brand development which according to statistics totaled at least $800 million. But neither International Financial Reporting Standard (IFRS) nor US GAAP allows recognition of internally generated brand". Therefore, empirical investigation of

value relevance of brand may provide an insight to Standard Setters.

Value relevance according to Barth *et al.* (2000) refers to the association between accounting amounts and security market value. They add that value relevance research operationalizes key dimensions of the FASB's theory to assess the relevance and reliability of accounting amounts. Konstantinos and Athanasios (2011), see value relevance as one of the most common methods of examining the quality of accounting information. This view is consistent with the conceptual framework of International Accounting Standard Board (IASB) that identifies relevance as a qualitative characteristic of financial accounting information. According to the Framework, information has the quality of relevance when it influences the economic decisions of users. Therefore, an accounting amount is deemed relevant if it has a significant association with security market value.

Ball and Brown (1968) examine the relationship of earnings with share returns; they concluded that high correlations are interpreted as a sign of accounting information of high quality. Therefore, value relevance studies show the extent to which particular accounting amount reflect information that is used by investors in valuing firm's equity value. In view of this, Lev and Zarowin (1999) and Amir and Lev (1996), opined that disclosure of value relevant information in the financial statements makes accounting information to be of quality. They attributed the less importance of financial accounting information to investors when focusing on firms from service and technological companies to lack of recognizing intangibles in the balance sheet, which they link to the accounting standard requirement of immediate expensing of intangibles in many cases.

Value relevance research is regarded in the accounting literature as joint test of relevance and reliability of accounting amount (Barth *et al*. 2000). They further argue that it is difficult to test separately relevance and reliability of an accounting amount. Reliability is a fundamental attribute of traditional historic cost accounting system, which some of the early classical accountants like Daines (1929); Littleton (1956) and Ijiri (1979) emphasized its importance as quality of accounting information. They based their arguments on the premise of objectivity and reproducibility that is accorded with reliability. They further lamented that the greatest advantage of reliability as quality of accounting information is that, it can be easily subjected to objective verification and therefore easy to use in practice. Hence, accountants are challenged on the reliability of data so that they would not be accused of intending to mislead the public (Ijiri, 1979).

Initially, standard setters and regulators considered the concept of reliability to mean objectivity and verifiability, and in essence precision. The FASB and IASB recognized reliability in their frameworks for the preparation and presentation of financial statements; FASB defined reliability as representational faithfulness, verifiability, and neutrality, with an overlay of completeness, freedom from bias, precision and uncertainty. While in the words of IASB reliability mean faithful representation, substance over form, neutrality, prudence and completeness. However, FASB in 2005 dropped the term 'Reliability' from the qualitative characteristics of accounting information and replace it with 'Faithful Representation' (FASB, 2005). Similarly, the IASB also adopted the concept 'Representational Faithfulness' as a main quality of accounting information, in place of reliability (Cho, Kim & Lim, 2006).

They identify four approaches that are used in the value relevance studies to provide separate evidence on reliability. The approaches are; is to model reliability to make specific predictions on how reliability affects coefficients estimates; is to compare the estimated valuation coefficients on the accounting amount being studied with theoretical benchmark coefficients; is to compare the estimated valuation coefficient on the accounting amount being studied to that on other amounts already recognized in financial statements; is to interpret a significant coefficient of the predicted sign on the accounting amount being studied as evidence of reliability.

1.3 Review of Empirical Literature

The Ball and Brown study in 1968 and the empirical work of EBO (1995) based on the framework of clean surplus accounting relation generated many studies that examine the value relevance of accounting information. Ohlson (1995) assesses the value relevance of accounting information, where he comes up with a valuation model relating price with book value and abnormal earnings. Based on this several empirical researches examine value relevance and reliability of accounting information, and intangible assets as well.

Based on the Ohlson framework, Collins, Maydew and Weiss (1997) study changes in the value relevance of earnings and book value form 1953-1993, and found a decrease in value relevance of earnings and increase in book values. They conclude that the joined value relevance of earnings and book value has not decreased. While, Brown, Lo, and Lys (1999) investigated changes in value relevance between 1958 and 1996, after controlling for scale effects, their results support the declining value relevance of accounting information. Lev and Zarowin (1999) found a significant decrease in the value relevance to investors of accounting information during the period 1980s. They attributed such a declining trend in the value relevance to the immediate expense of R&D and restructuring costs, which depresses reported earnings and book values despite the fact that they generate cash flows to the firms and enhances firm values. A similar study was conducted by Francis and Schipper (1996) and the results show a decrease in the value relevance of accounting information.

Keener (2003) examines the impact of accounting information on price by examining changes in value

relevance. He found that the joint value relevance of earnings and book value has not decreased over the sample period. The study also demonstrates that the incremental value relevance of earnings has increased and of book value has stayed constant for the sample period. He concludes that there is no incremental value relevance of earnings and book value across industries.

In assessing the value relevance of intangible assets, Aboody and Lev (1998) assessed the value relevance of capitalization of software development costs to investors during the period 1987 to 1995. Their results show that annually capitalized development costs are positively associated with stock returns and the cumulative software assets reported on the balance sheet is associated with stock prices. They also found that software capitalization data are associated with subsequent reported earnings, indicating another dimension of relevance to investors. They conclude that capitalization of intangible assets (software) is value relevant and that capitalization of intangible assets will not decrease the quality of reported earnings. In contrast, Oswald (2000) reports that intangible assets are not value relevance to investors using market value and R&D expenditures. Also, evidence from France by Crazavan-Jeny (2002) proves that intangible assets other than goodwill are not value relevance.

Using market penetration and operating performance as a proxy for intangible assets, Amir and Lev (1996) study the value relevance of financial and nonfinancial information to investors in a sample of 14 US cellular firms and conclude that intangible assets are value relevance, by using stock prices. On the other hand, Lev and Zarowin (1998) investigate the usefulness of financial information to investors by comparison to the total information in the market place for the period of twenty years (1977 – 1996). Their findings indicate that the relevance of reported earnings, cash flows and book values of equity has been deteriorating. They also document adverse informational evidence of the accounting treatment of intangible assets through the existence of positive association between the rate of business changes and shifts on R&D spending; and the association between changes in the informativeness of earnings and changes in R&D spending.

Carazavan-Jeny, and Jean-Jeny, (2003) study the value relevance of intangible assets accounting using R&D on a three years period (1998-2000). Their study is unique in the sense that both expensing and capitalization of R&D are allowed. They found that capitalized R&D is positively associated with stock returns and stock prices, whereas expensed R&D is negatively related to stock return on stock prices. They conclude that, capitalization of intangible assets is not only value relevant but also expensing of R&D expenditures conveys a negative signal to markets.

Value relevance of brand or advertisement was first investigated by Comanor and Wilson (1967). Their results reveal the usefulness of advertising intensity as a proxy for product differentiation entry barrier, finding a consistent relationship between industry and firm-specific profit rates and advertising intensity. Similar study was conducted by Abdel-Khalik (1975) and found that advertising expenditure is value relevant in the food and drug and cosmetics industries and not in the tobacco and soap and cleansers industries. Hirschey (1982) examine the intangible capital aspects of advertising and R&D expenditures, by investigating the effects of advertising and R&D on the market value. The results indicate that, on average advertising and R&D expenditures have positive and significant market value effect. Similarly, Weygandt and Hirschey (1985) found that both advertising and R&D expenditures have systematic effects on the market values, thus value relevance. Kim and Chung (1997) provide empirical evidence on the value relevance of brand which is significantly related to market value in a sample of US and Japanese automobile companies.

Kallapur and Kwan (2002) assess the value relevance and reliability of brand assets recognized by 33 UK firms, and the stock price reaction to the announcement of brand capitalization. They found that brand assets are value relevant, that is, there is significant association with market values. The results also indicate that brand asset measures might not be reliable.

Gleason and Klock (2006) investigate whether measures of intangible assets based on advertising and R&D can explain variation in Tobin's Q ratio for the pharmaceutical and chemical industries using data from 1982 to 2001. Their findings show that advertising and R&D are statistically significant determinants of Tobin's Q and therefore, value relevant. Jackson (2008) Study the unrecorded advertising intangible assets in the valuation gap and conclude that advertising expenditures have a long run correlation with cumulative excess returns. The study concludes the value relevance of advertising expenditure and support the capitalization of part of advertising expenditures. Beijer, Dekimpe, Dutordoir, and Verbeeten (2008) study the impact of inter-brand value announcements on the value relevance of brand by documenting a statistically and economically significant effect of brand value announcement on stock prices. That is, stock price are generally increasing in the magnitude of the brand value charged.

All these studies are conducted in foreign countries, empirical evidences from Nigeria show mixed results, in a systematic study of blue chips firms in the Nigerian stock market, Bello (2010) examine the value relevance of accounting information to investors' decisions in Nigeria. The result indicates that book value is more informative to investors, but looking at the recent theoretical development in capital market research and theory in which intangible assets is playing a critical role, he concludes that accounting information is less

relevant to investor. In contrast, Oyerinde (2011) conducts a research on the value relevance of accounting data in Nigeria between the periods of 2002-2007. The study found that accounting information is value relevant. In a most time bearing study of value relevance of accounting information reported by Nigerian New Economy Firms by Abubakar (2011), the study reveal that intangible assets are value relevant.

1.4 Theoretical Framework

This study is a form of capital market research that is founded on positive accounting theory which investigates the association between accounting information announcement and the behavior of share price. According to Gaffikin (2004) positive accounting researches focus on the motives of managements and regulators in making accounting choices with respect to markets. Watts and Zimmerman (1986) states that the aim of positive accounting theory is to explain the world in which we live, as such it attempts to provide answers to why certain accounting methods are chosen over others. Moreover, positive accounting theory applies the methodology of science to investigate accounting phenomena. Therefore, positive accounting theory research is designed to explain, and provide reasons for why accounting takes the form it does and predict how accounting changes across time and place.

Based on the foregoing paragraphs, this study is a form of positive accounting research that seeks to investigate the effect of intangible assets recognition on the quality (relevance) of accounting information. Generally, firm productivity and economic growth are factors that are usually considered in making accounting choice both from opportunistic and efficiency grounds. From traditional point of view, firm productivity and economic growth is seen as a product of growth in labor and capital (Slow, 1956). And that any growth that is not explained by increases in labor and capital is associated with technological progress and intangible investments Denilson (1967). The theories that explain intangible assets and economic growth of economic entity include human capital theory, innovation theory, theory of intellectual investment and the new growth theory or evolutionary theory.

However, the theories that provide an appropriate framework for this study are the innovation theory and new growth theory within the purview of accounting valuation theory that is based on the clean surplus relation. This is informed by the fact that innovation according to Schumpeter (1942) connote diffusing product into the market, which is the primary role of brand equity. Moreover, the new growth theory contends that, the wide gap between the market value and book value of new economy firms that the traditional accounting valuation theory has not captured is the growth and development resulted from the revolution from industrial economy to knowledge-based economy. Thus, they are suitable for explaining the relationship between intangible assets and the financial performance and position of an organization as well as the competitive advantage and firm value.

From accounting valuation perspective, Edward and Bells (1961) develop a residual income valuation (RIV) model that uses forecast profits in place of forecast dividends on the bases of economic theory of business income measurement. Their work produced a “clean surplus” measure of income that is, the difference between opening and closing balance sheet. The RIV model provides the bases on which Ohlson (1995) was able to build a model that has enabled researchers to understand more clearly the role of many features of accounting of relevance in capital markets-based accounting research. Therefore, the Ohlson (1995) model is also referred to as Edwards, Bells and Ohlson (EBO, 1995) Model. The Ohlson model represents firm value as a linear function of book value of equity and the present value of expected future abnormal earnings. The model assumes perfect capital markets, and with additional assumption of linear information dynamic, firm value can be re-expressed as a linear function of book value, net income and dividends (Ohlson, 1995). One of the major characteristics of the Ohlson price model and its refinements is the notion of economic rents, that is, returns in excess of the cost of capital for a finite number of periods are captured in the persistence parameters on abnormal earnings. This economic rent according to Barth *et al*., (2000) in the Ohlson framework is reflected in the model by including the present value of the future cash flows attributable to recognized assets as a component of equity book value. They further stressed that many intangible assets are attributable to economic rents. Therefore, the model for value relevance test in this work is EBO price model. This is because the use of the model is consistent with the definition of value relevance that assumes market value of equity reflects all publicly available, relevant information (Jaafar & Clift, 2009). The model relies on the “clean surplus accounting” relation, in which the intrinsic value of a firm can be expressed as original investment (original book value) plus the present value of infinite abnormal earnings beyond that investment.

3.1 Research Methodology

3.2 Research Design

In this study correlation research design using panel data was used because the method is consistent with the value relevance study of accounting information. The aggregate stock market reaction to accounting information method is employed using Edward-Bell-Ohlson (1995) model, also called EBO model, to assess the joint

incremental value relevance of capitalizing intangible assets. This is carried out by comparing the adjusted R squared of the adjusted and unadjusted accounting information. While in assessing the reliability of measuring and disclosing intangibles as assets the significant coefficient of intangible assets in the modified EBO model is used.

3.3 Population and Sample of the Study

In arriving at the population of this study, listed companies in the Nigerian Stock Exchange (NSE) Market that are considered as intangible-intensive or high-technology are selected (as contained in Appendix A). The selection is based on the extent of their involvement in high-technology activities and significant investment in brand building activities (marketing and promotional activities). High-tech firms are preferred because of the large and increasing gap between their market value and book value, and thus, their major assets are valuable patents, widely recognized brands name, and highly qualified staff (Zhang, 2003 and Lev & Daum 2004). Therefore, 131 firms emerged from which 94 firms are dropped using some devised criteria, and the remaining 37 firms considered as the population of the study. The selection criteria are: Firstly, firm must have all the required data necessary to estimate the models of the study in the either the NSE Fact Book for 2005-2011, Annual Reports and Accounts of the firm in hard copy or in its official website, or the Daily Listing of the Exchange; secondly, firm must have positive difference between book value and market value of equity in all the years under consideration; and lastly, firm must be in operation two years before the period of the study, which is the requirement for brand building.

The sample size of 9 firms is drawn from the population of 37 firms (using Ralph, Holleran and Ramakrishnan, 2002), while for the selection of the firms, simple random sampling technique is employed. The, Ralph, *et al.* (2002) criteria for sample size determination is as follows:

$$n = \frac{\log \beta}{\log P}$$

Where: β = the chosen degree of precision in terms of significance level (usually 5%)
P = represents the proportion of the unsuccessful firms
n = sample size

By substitution, we have:

$$n = \frac{\log 0.05}{\log 0.7176}$$

$$= \frac{-1.3010}{-0.1441}$$

$$= 9.0285$$

Therefore, nine (9) companies make up the sample of the study.

3.4 Technique of Data Analysis and Model Specification

The study employs Ordinary Least Square (OLS) regression technique after transforming the data for the effect of the problems of heteroskedasticity, as the tool for the analysis. This is because the variables of the study include market prices of equity and earnings, in which volatility is much likely. And, also the use of OLS in the presence of heteroskedasticity provide spurious regression problem that can lead to statistical bias (Granger & Newbold, 1974). Similarly, Gujarati (2004:399) states that, "…whatever conclusions we draw or inference we make may be very misleading". In addition, the stationery assumption underlying OLS regression analysis does not hold in time series panel data, as confirmed by Chang, Chen, Su and Chang (2008). In their study, they found that, stock prices and earnings are mostly non-stationery. The analysis is conducted using Statistics/Data Analysis Software (STATA 10.0).

In order to test the hypotheses formulated in this study, EBO price model is employed as follows;

$$MVS_{it} = \alpha + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 \Delta EPS_{it} + \varepsilon_{it} \quad \text{……ii}$$

Where MVS_{it} is market value per share of firm I in year t three 90 days after the accounting date, BVS_{it} book value per share of firm I in year t, EPS_{it} earnings per share of firm I in year t, ΔEPS_{it} changes in earnings per share of firm I in year t, and ε_{it} is the residuals. However, per share accounting information are used to address the potential effects of scale on the estimates.

In order to assess the joint incremental value relevance, the accounting information in model two are adjusted by capitalizing the intangible (brand assets), following the criteria provided in IFRS 16 and IAS 38, as follows;

ABVS = Book value plus amortized brand assets divided by number of equity shares
AEPS = Reported earnings plus expensed brand expenditures minus amortization cost and income tax divided by number of equity shares
AΔEPS = Difference between adjusted earnings in year t minus adjusted earnings in year t-1

Emanating from this, the model is now;

$MVS_{it} = \alpha + \beta_1 ABVS_{it} + \beta_2 AEPS_{it} + \beta_3 A\Delta EPS_{it} + \varepsilon_{it}$ ……iii

The explanatory power of model two and three are used to test the first hypothesis, that is, to examine the joint incremental value relevance of reporting intangible assets in the balance sheets of high technology firms in Nigeria.

Following Aboody and Lev (1998), and Kallapur and Kwan (2002) this study measures the reliability of measuring and disclosing Brand assets by modifying model two as follows;

$MVS_{it} = \alpha + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 BAS_{it} + \varepsilon_{it}$ ……iv

Where BAS_{it} is Brand assets per share of firm I in year t; measured consistent with IAS 38 that is intangible assets should initially be recognized at cost, therefore, the study uses costs of marketing, distribution, advertisement/ promotional activities at the end of financial year, in line with Barth *et al.,* (1998) and as contained in the Fernandez (2008). The study used two criteria to infer reliability; by interpreting a significant coefficient of the predicted sign on the Brand equity ($+\beta_3$); and by comparing the coefficient on the Brand equity (β_3) with the coefficients on earnings (β_2) and book value of equity (β_1).

4.1 Results and Discussions

4.2 Descriptive Statistics

The descriptive statistics of the data collected for the variables of the study are presented in Table 4.1 as follows:

Table 4.1 Descriptive statistics

	Mean	Std. Dev.	Min.	Max.
Unadjusted				
MVS	84.20	100.17	1.30	425.5
lnMVS	3.46	1.64	0.26	6.05
BVS	10.16	9.09	0.12	29.64
EPS	4.73	5.29	-0.49	21.21
ΔEPS	0.64	1.86	-4.78	6.38
BAS	4.98	5.96	0.04	19.67
Adjusted				
ABVS	15.38	12.13	0.74	44.29
AEPS	7.44	8.02	-0.05	31.32
ΔAEPS	1.06	2.46	-5.56	9.63

Source: Stata Output (Appendix C1)

Table 4.1 presents the summary results of all the variables of the entire panel of nine firms over seven years (2005-2011). The average market value per share (MVS) three month after the accounting dates is ₦84.21 with standard deviation of 100.17. This implies that, the market values can deviate from mean to both sides by 100.17. This together with the wide range of ₦424.20 (i.e, the difference between the minimum and maximum values of ₦1.30 and ₦425.50) make the market value as dependent variable to be not normally distributed and hence, non-stationary. This could potentially bias estimation with OLS technique of analysis. Moreover, the firms in the sample are from different sectors, and hence, heterogeneous. Consequently, the wide range between the minimum value (₦1.30) and the maximum (₦425.50) of the market value, on the other hand, the average market value of ₦84.21 which is approximately 8 times higher than the book value before disclosing brand as assets and 5 times after disclosing brand as assets, over the entire period of the study suggests that absent of intangible assets on the balance sheets accounts for the increasing gap between the market and book value of firms as suggested by Lev and Zarowin (1998). They characterized this as a decline in quality of financial statements. However, to control for the effect of the potential heteroskedasticity on the results as a result of the heterogeneity of the firms in the sample, the natural log of market value per share is used hence forth. This gives the average market value of 3.46 with standard deviation of 1.64. The minimum and maximum values are 0.26 and 6.05 respectively.

From the table, the average book values per share (BVS) before and after disclosing brand as assets are ₦10.16 and ₦15.38 with standard deviation of 9.09 and 12.13 respectively. This implies that disclosing brand as assets could improve the quality of financial statements in terms of information content as stated by Shehu (2012), that, to achieve the quality of understandability, the financial statements should contain full disclosure and higher level of transparency. As such, disclosing brand as assets in this study provides 51% increment in the book value, with minimum and maximum of ₦0.12 and 29.64, and ₦0.74 and ₦44.29 before and after capitalizing brand respectively. The average earnings per share (EPS) before recognizing brand as asset is ₦4.73 with standard deviation of 5.29, and minimum and maximum values of –₦0.49 and ₦21.21 respectively. However, when the brand is recognized as asset the true and fair average value of earnings is ₦7.44 with standard deviation of 8.02 and minimum and maximum values of –₦0.05 and –₦31.32. Similarly, the average changes in earnings per before disclosing brand as assets is ₦0.64 with standard deviation of 1.86, and minimum

value of ₦4.78 and maximum value of ₦6.38. The average brand assets per share (BAS) is ₦4.98 with standard deviation of 5.96 and minimum value of –₦0.04 and ₦19.67 as the maximum value. This indicates the substance and significance of the expenditures on brand, that is, brand expenditures is equal or more than expenditures in other tangible fixed assets. This result is consistent with Nakamura (2003) and Skinner (2007), where they provide evidence from U.S.A expenditures in intangible assets is roughly more than or equal to investments in tangible assets.

4.3 Correlation Matrix of the Variables

The following table presents the correlations among the variables used in the regression analysis of the study;

Table 4.2 Correlation matrix

	MVS	BVS	EPS	ΔEPS	BAS
Unadjusted					
MVS	1				
BVS	0.777**	1			
EPS	0.833**	0.785**	1		
ΔEPS	0.334**	0.277*	0.535**	1	
BAS	0.669**	0.402**	0.762**	0.278*	1
Adjusted					
MVS	1				
ABVS	0.860**	1			
AEPS	0.816**	0.891**	1		
ΔAEPS	0.401**	0.361**	0.558**	1	

Source: Stata Output (Appendix C2)

**correlation is significant at the 1% level (2-tailed)

*correlation is significant at the 5% level (2-tailed)

The results from table 4.2 show that, there is statistical significant positive relationships between market value per share (MVS) and book value per share (BVS), earnings per share (EPS) and brand assets per share (BAS), both before and after disclosing brand as asset. However, when the book value is adjusted for brand assets, the association between market value and book value has significantly increased (from 0.777 to 0.860), signifying the value relevance of intangible assets (brand). On the contrary, the association between earnings and market value dropped (from 0.833 to 0.816) signifying the biasness contained in the reported earnings as a results of expensing intangible assets, instead of reporting them in the balance sheets as assets. This is consistent with Carazavan-jeny, and Jean-jeny, (2003) who find that expensing intangible assets convey a negative signal to market. Moreover, the table show a positive relationship between market value and change in earnings before and after adjusting for intangible assets; R value of 0.334 and 0.401 respectively, both at 1% level of significance (p-value of 0.008 and 0.001). The table also reveals a significant statistical positive relationship between market value and brand assets (R value of 0.669) at 99% level of confidence. This implies that market values brand, and hence, it can be inferred that brand is value relevance in the high-technology firms in Nigeria.

4.4 Hypotheses Testing

To assess the joint incremental value relevance of recognizing brand as assets, the study compares regression results of model two and three as presented in Table 4.3 below:

Table 4.3 Summary Regression Result

Variables	Unadjusted Model	Adjusted Model
R	0.860	0.868
R square	0.740	0.754
Adj. R square	0.727	0.741
F-stat	55.97	60.27
p-value	0.000	0.000
Constant	2.027 (0.000)	1.737 (0.000)
BVS	0.051 (0.013)	0.092 (0.000)
EPS	0.205 (0.000)	0.036 (0.307)
ΔEPS	-0.088 (0.228)	0.038 (0.503)
Hettest: Chi2	0.55 (0.457)	0.05 (0.823)
Smallest Tolerance Value	0.275	0.142
Highest Variance Inflation Factor	3.63	7.05

Source: Stata Output (Appendix C3 & C4)

The results from Table 4.3 show a significant statistical positive relationship (R value of 0.860 before

and 0.868 after disclosing brands as asset) between the dependent variable (MVS) and the independent variables (BVS, EPS and ΔEPS). The F statistic of 55.97 and 60.27 before and after disclosing brand as assets respectively, show the overall fitness of the models at 99% level of confidence (p-value of 0.000). The results indicates a positive coefficient on book value (0.051) before capitalizing brand, and 0.092 after the disclosure, signifying that when intangible is incorporated in the book value, the value relevance of book value has improved. Similarly, the significance of book value increased (from p-value of 0.013 to 0.000) when book value is adjusted for intangible assets. On the other hand, the results show that accounting earnings before adjusting for intangible assets is significant at 99% confidence level (coefficient of 0.205 with p-value of 0.000), however, when earnings are adjusted for intangibles, is not significance at all level of significance (p-value of 0.307). This suggests that accounting earnings of high-technology firms in Nigeria is biased when intangible assets are expensed. Moreover, change in earnings both before and after disclosing brand as assets has no significant effect on the market value from the p-values of 0.228 and 0.503 respectively. This implies investors do not value the changes or growth in earnings of high-technology firms in Nigeria, thus, changes in earnings are not a good major of value. However, when brand is disclosed as assets the effect of book value has increased by 80% (from 0.051 to 0.092) with a consistent increased in significance (from p-value of 0.013 to 0.000), signifying the value relevance of disclosing intangibles as assets in the balance sheets.

The Breusch-Pagan/Cook-Weisberg test for heteroskedasticity (hettest, Chi2 of 0.55 with p-value of 0.458) signify the absent of heteroskedasticity before adjusting for intangibles; similarly, the test after disclosing intangibles as assets show the absent of heteroskedasticity (Chi2 of 0.05 with p-value of 0.823). Also, the test for collinearity show the absent of perfect multicollinearity among the independent variables, because the highest variance inflation factor (VIF) is 3.63 and the lowest Tolerance value (TV) is 0.28. After the adjustment for intangibles, the collinearity test also shows the absent of perfect multicollinearity; the highest VIF is 7.05 and the lowest TV is 0.14. Moreover, the test for autocorrelation indicated that there is no severe serial correlation that has significant effect on the estimations. Because the panel is micro which Baltagi (2008) and Torres-Reyna (2010) confirm that serial correlation is not a problem in micro panels with very few years, but a problem with macro panel with long time series (over 20-30 years). Similarly, both Woolridge and Breusch-Godfrey test for autocorrelation in panel data proved that the panel is not large enough to assume the effect of serial correlation.

In view of these, the adjusted R squares reveal that, the independent variables, accounting information (book value, earnings and changes in earnings) explained 72.6% before, and 74.1% after disclosing brand as assets, of the variation in the dependent variable (market value). This together with the improvement in the overall fitness of the model after disclosing brand as assets (F statistic of 60.27 against 55.97 which is significance at 1% level of significance), testify that there is incremental value relevance of disclosing brand as assets in the balance sheets of high-technology firms in Nigeria. Based on this evidence, the study reject the null hypothesis one which state that, there is no incremental value relevance of disclosing brand as assets in the financial statements of high-technology firms in Nigeria.

To assess the reliability of measuring and disclosing brand as assets in the balance sheets of high-technology firms in Nigeria, the study estimates the second model of the study, the following table presents the results;

Table 4.4 Summary Regression Results

Variables	Statistics
R	0.873
R square	0.763
Adj. R square	0.751
F-stat	63.26
p-value	0.000
Constant	1.841 (0.000)
BVS	0.086 (0.000)
EPS	0.071 (0.171)
BAS	0.083 (0.009)
Hettest: Chi2	0.00 (0.966)
Smallest Tolerance Value	0.147
Highest Variance Inflation Factor	6.80

Source: Stata Output (Appendix C5)

Table 4.4 shows a significant statistical positive relationship (from the correlation coefficient, R value of 0.873) between market value and the independent variables (book value, earnings and brand assets). It also shows that the independent variables together explained approximately 75.1% of the variation in the dependent variable (from the adjusted coefficient of determination, Adj. R square of 0.751). The overall fitness of the model is indicated by the F value of 63.26 at 99% level of confidence (p-value of 0.000). The coefficient on book value shows that, book value has significant effect on the market value (0.086) which is significant at 1%

level of significant. Similarly, the results show that earning is not significant at all level of significant as indicated by the P-value of 0.171. This is not far away from the way market value intangible assets as shown by the coefficient of 0.083 at 99% confidence level.

The Breusch-pagan/Cook-weisberg test for heteroskedasticity (hettest, Chi2 of 0.00 with p-value of 0.966) signifies the absent of heteroskedasticity. Also, the test for colinearity show the absent of perfect multicollinearity among the independent variables, because the highest VIF is 3.24 and the lowest TV is 0.31. Additionally, there is no severe serial correlation considering the micro nature of the panel. Therefore, since brand assets have significant coefficient in relation to market value, and the coefficient is different from zero and also more than that of earning, the study reject the second null hypothesis that state that, there is no significant reliability of measuring and disclosing intangibles as assets in the financial statements of high-technology firms in Nigeria. And, hence, it can be inferred that there is reliability in disclosing brand as assets in the balance sheets of high technology firms in Nigeria.

The major implication of this findings is that, the financial statements of high-technology firms do not contain an important value generating intangible assets (brand assets) and therefore, regulators and standard setters (IFRS) should broaden the scope of IAS 38 to include internally generated intangibles (brand assets). This is supported by the fact that brand asset is value relevant and reliable which are the two primary qualitative characteristics of financial accounting information.

5.1 Conclusion and Recommendations

The study found that there is joint incremental value relevance of recognizing intangible assets (brand assets) in the balance sheet of high-technology firms in Nigeria. Specifically, the study found that accounting earnings are more value relevance than book values when intangible assets are expensed in the income statement. But when accounting information is adjusted for intangible assets, book values show significant value relevance than earnings, and, on the overall, the combined value relevance has increased. In addition, the study found that, there is reliability of measurement and recognition of intangible assets (brand) in the balance sheets of high-technology firms in Nigeria. Similarly, the study found that intangible assets are value relevant and book value is more value relevant that accounting earnings.

Based on the findings from this study, the study recommends that, regulators and standard setters (IFRS) should broaden the scope of IAS 38 to include internally generated intangibles (brand assets). That is, capitalization of investments in brand building (marketing and advertisement/promotional expenditures), which means recognizing intangible assets, *"Brand"* in this case, in the balance sheets of listed high-technology firms in Nigeria will increase the quality of their accounting information.

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Appendix A
List of NSE Classified Sectors Considered as High-tech Firms

S/N	Sector Title	No. of Firms	Selected firms
1	Agriculture & Agro Allied	8	1
2	Airline Services	2	0
3	Automobile & Tyre	2	0
4	Banking	21	4
5	Breweries	7	2
6	Building Materials	7	1
7	Chemicals & Paints	9	3
8	Computer & Office Equipments	6	1
9	Conglomerates	8	3
10	Engineering Technology	3	2
11	Food, Beverages & Tobacco	17	4
12	Health Care	8	4
13	Industrial Domestic Products	7	3
14	Information Communication & Telecommunications	4	1
15	Packaging	9	3
16	Petroleum Marketing	9	3
17	Printing & Publishing	4	2
	Totals	**131**	**37**

Source: Nigerian Stock Exchange Factbook (2010/2011)

Appendix B
Sampled Firms of the Study

S/n	**Firm**	**Sector**
1	Cutix plc	Engineering technology
2	Flourmills of Nigeria plc	Food & beverages
3	Guiness plc	Breweries
4	Nestle plc	Food & beverages
5	Neimeth plc	Health care
6	Total plc	Petroleum marketing
7	UACN plc	Conglomerate
8	Vitafoam plc	Industrial domestic product
9	7up plc	Food & beverages

Appendix C

```
. use "C:\Stata 10\DATAJNAL.dta"

. xtset id yr, yearly
      panel variable:  id (strongly balanced)
       time variable:  yr, 2005 to 2011
               delta:  1 year
```

1. Descriptive Statistics

```
. su MVS lnMVS BVS EPS CEPS BAS ABVS AEPS ACEPS
```

Variable	Obs	Mean	Std. Dev.	Min	Max
MVS	63	84.20492	100.1648	1.3	425.5
lnMVS	63	3.462125	1.638169	.2623642	6.053265
BVS	63	10.16287	9.086959	.12	29.64
EPS	63	4.730251	5.293952	-.49	21.21
CEPS	63	.6392557	1.857535	-4.781536	6.381052
BAS	63	4.98346	5.959346	.0379991	19.67084
ABVS	63	15.37881	12.13362	.7415132	44.29837
AEPS	63	7.437281	8.021594	-.0493256	31.32115
ACEPS	63	1.059263	2.459833	-5.558397	9.627714

2. Correlation Matrix

```
. pwcorr lnMVS BVS EPS CEPS ABVS AEPS ACEPS BAS, star (0.05) sig
```

	lnMVS	BVS	EPS	CEPS	ABVS	AEPS	ACEPS
lnMVS	1.0000						
BVS	0.7770*	1.0000					
	0.0000						
EPS	0.8329*	0.7845*	1.0000				
	0.0000	0.0000					
CEPS	0.3340*	0.2769*	0.5352*	1.0000			
	0.0075	0.0280	0.0000				
ABVS	0.8603*	0.7868*	0.8440*	0.2977*	1.0000		
	0.0000	0.0000	0.0000	0.0178			
AEPS	0.8162*	0.6701*	0.9623*	0.4652*	0.8909*	1.0000	
	0.0000	0.0000	0.0000	0.0001	0.0000		
ACEPS	0.4014*	0.2371	0.5744*	0.9064*	0.3610*	0.5583*	1.0000
	0.0011	0.0613	0.0000	0.0000	0.0037	0.0000	
BAS	0.6685*	0.4018*	0.7615*	0.2781*	0.8307*	0.9078*	0.4338*
	0.0000	0.0011	0.0000	0.0273	0.0000	0.0000	0.0004

	BAS
BAS	1.0000

3. Regression Results of Model II

$MVS_{it} = \alpha + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 \Delta EPS_{it} + \varepsilon_{it}$

```
. reg lnMVS BVS EPS CEPS
```

Source	SS	df	MS		
Model	123.119573	3	41.0398576	Number of obs	63
Residual	43.2635603	59	.733280684	F(3, 59)	55.97
				Prob > F	0.0000
Total	166.383133	62	2.68359892	R-squared	0.7400
				Adj R-squared	0.7268
				Root MSE	.85632

lnMVS	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BVS	.0513136	.0200591	2.56	0.013	.0111753	.0914518
EPS	.2051017	.0391654	5.24	0.000	.1267319	.2834715
CEPS	-.0877381	.0720397	-1.22	0.228	-.2318892	.0564131
_cons	2.026537	.1626315	12.46	0.000	1.701112	2.351962

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnMVS

         chi2(1)      =     0.55
         Prob > chi2  =   0.4567

. vif
```

Variable	VIF	1/VIF
EPS	3.63	0.275115
BVS	2.81	0.355973
CEPS	1.51	0.660481
Mean VIF	2.65	

```
. estat bgodfrey
sample may not include multiple panels
r(459);

. estat dwatson
sample may not include multiple panels
r(459);

. predict e, residual

. swilk e
```

	Shapiro-Wilk W test for normal data				
Variable	Obs	W	V	z	Prob>z
e	63	0.96942	1.728	1.183	0.11845

4. Regression Results of Model III

$MVS_{it} = \alpha + \beta_1 ABVS_{it} + \beta_2 AEPS_{it} + \beta_3 A\Delta EPS_{it} + \varepsilon_{it}$

```
. reg lnMVS ABVS AEPS ACEPS
```

Source	SS	df	MS		
Model	125.446162	3	41.8153873	Number of obs	= 63
Residual	40.9369713	59	.693846971	F(3, 59)	= 60.27
				Prob > F	= 0.0000
Total	166.383133	62	2.68359892	R-squared	= 0.7540
				Adj R-squared	= 0.7414
				Root MSE	= .83297

lnMVS	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ABVS	.0921307	.0205916	4.47	0.000	.0509269	.1333345
AEPS	.0361138	.0350101	1.03	0.307	-.0339412	.1061689
ACEPS	.0374765	.0556028	0.67	0.503	-.0737844	.1487373
_cons	1.736978	.1788584	9.71	0.000	1.379084	2.094873

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnMVS

         chi2(1)      =     0.05
         Prob > chi2  =   0.8233

. vif
```

Variable	VIF	1/VIF
AEPS	7.05	0.141894
ABVS	5.58	0.179271
ACEPS	1.67	0.598230
Mean VIF	4.77	

```
. estat bgodfrey
sample may not include multiple panels
r(459);

. estat dwatson
sample may not include multiple panels
r(459);

. predict e1, residual

. swilk e1
```

	Shapiro-Wilk W test for normal data				
Variable	Obs	W	V	z	Prob>z
e1	63	0.97980	1.142	0.287	0.38712

5. Regression Results of Model IV

$MVS_{it} = \alpha + \beta_1 BVS_{it} + \beta_2 EPS_{it} + \beta_3 BAS_{it} + \varepsilon_{it}$

```
. reg lnMVS BVS EPS BAS
```

Source	SS	df	MS		
Model	126.924346	3	42.3081153	Number of obs	63
Residual	39.4587874	59	.668793006	F(3, 59)	63.26
				Prob > F	0.0000
Total	166.383133	62	2.68359892	R-squared	0.7628
				Adj R-squared	0.7508
				Root MSE	.8178

lnMVS	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
BVS	.0857367	.0210946	4.06	0.000	.0435265	.1279469
EPS	.070914	.0511569	1.39	0.171	-.0314507	.1732787
BAS	.0832445	.0307778	2.70	0.009	.0216582	.1448308
_cons	1.840508	.1693307	10.87	0.000	1.501678	2.179338

```
. hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of lnMVS

         chi2(1)      =     0.00
         Prob > chi2  =   0.9664

. vif
```

Variable	VIF	1/VIF
EPS	6.80	0.147073
BVS	3.41	0.293576
BAS	3.12	0.320647
Mean VIF	4.44	

```
. estat bgodfrey
sample may not include multiple panels
r(459);

. estat dwatson
sample may not include multiple panels
r(459);

. predict e2, residual

. swilk e2
```

	Shapiro-Wilk W test for normal data				
Variable	Obs	W	V	z	Prob>z
e2	63	0.98714	0.727	-0.690	0.75492

```
.
```

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