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Is the residual income metric of a relevant value? evidence from Saudi Arabia

Salah Ahmed Oraby[1*]
[1]Accounting Department- Faculty of Administrative and Financial Sciences Saudi Electronic University, Saudi Arabia; s.oraby@seu.edu.sa (S.A.O.).

Abstract: The study aimed to investigate the value relevance of the residual income metric using Ohlson's valuation model [1] as the study applied to 10 Saudi banks registered on the Saudi Stock Exchange (TASI). The study employed the panel data method and least squares regression models to test the study's hypotheses and the Sharpe model to calculate the cost of capital. The results of the regression models that captured the individual value relevance of the residual income metric showed that the residual income had neither value relevance with the stock price, i.e., the price model, nor value relevance with the net annual returns on shares. I.e., Returns model. The results of the regression models, which aim to capture the collective and interactive value relevance, were obtained by adding the residual income metric to the earnings per share and the book value per share in Ohlson [1] model. The analysis revealed that the residual income metric exhibited value relevance in both the price and returns models. The study results are helpful to several stakeholders, including accounting standards setters and regulators of the capital market, as they indicate the importance of the residual income metric, which complements other accounting metrics, such as earnings per share and book value per share.

Keywords: *Beta, Book value per share, Cost of capital, Earnings per share, Market risk.*

1. Introduction

The Value relevance research investigated the usefulness of accounting information to investors in capital markets as an accounting variable of value relevance, to determine if it had a statistical relationship with the market values of shares. The Value Relevance research measured the usefulness of accounting information from the perspective of equity investors. The accounting information has value relevance if it positively and statistically impacts the market value of shares or the returns on shares. Several studies have been conducted on the relevance of accounting information, such as the book value per share and earnings per share, which are included in the Olson Price model [1]. However, the Olson Price model included error terms, i.e., allowing for the use of other accounting information. According to the model, the market value of the share price is a function of both the book value and earnings per share, as the value relevance studies explain how stock exchanges react to accounting information.

Traditional accounting metrics, such as return on assets (ROA), return on equity (ROE), and earnings per share (EPS), came into existence in the late 1910s [2-4]. Since then, they have been used to measure organizations' financial performance. Fisher [5] and Hirshleifer [6] developed the discounted cash flow approaches, Such as net present value and the internal rate of return. Sharpe [7]; Lintner [8]; Mossin [9] and Black [10] introduced the Capital Asset Pricing Model (CAPM). Solomons [11] developed the residual Income (RI) to measure the performance of departments. Tobin [12] developed Tobin's Q. [13] worked on Free Cash Flow models. Rappaport [14] and Stewart [15] introduced the Shareholder Value approach. Wallace [16] confirmed that using the residual income metric in compensation plans instead of earnings per share and operating profits increased shareholders'

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* Correspondence: s.oraby@seu.edu.sa

wealth. However, Sloof and Van Praag [17] showed that the economic value added is a distorted performance metric and resulted in unplanned agent behavior.

Several studies have investigated whether innovative value-based metrics are superior to traditional accounting performance metrics in measuring financial performance. Pratt, et al. [18] developed a model to inform management and investors whether firms achieve earnings over their capital cost. Warren [19] explained that the return on assets had a weakness as it might drive divisional managers to reject new projects that could be profitable for the company, and the residual income can overcome this weakness. The significant advantage of residual income as a performance metric is that it considers both the minimum acceptable return on invested assets and the operating income for each division. As a result, the residual income supported division managers in maximizing operating income above the minimum. This provided an incentive to accept any project that yielded a return on investment exceeding the minimum required return by the shareholders.

1.1. Study's Problem

Alturki [20] stated that the traditional profitability metrics, such as the return on assets and the return on equity, were insufficient to measure the performance of banks, as high profitability is interpreted as a strength or weakness in terms of high risks. Therefore, there was a need for risk-adjusted performance metrics such as the residual income. The problem of the study represented in the limitations of the previous studies that investigate the value relevance of the residual income in general and in particular for banks in the Saudi Arabia, as most prior studies only focused on examining the value relevance of traditional accounting information such as the book value per share and the earnings per share. The empirical results on the value relevance of accounting information were mixed. Therefore, the study aimed to investigate whether investors in capital markets react to the residual income metric or only respond to earnings per share and book value per share, as published in the financial statements of Saudi banks.

In contrast to several studies, this study employed both the price and returns models to gain an in-depth understanding of how users assess the quality of accounting information. The study's importance comes from the fact that the importance of accounting information has increased after the application of the International Financial Reporting Standards [21]. Based on the study's problem, the study raised the following questions to answer.

- Is the residual income of a relevant value with the share price?
- Is the residual income of a relevant value with net returns on shares?
- Is the book value a relevant value with the share price?
- Is the book value a relevant value with net returns on shares?
- Is the earnings per share relevant to the share price?
- Is the earnings per share of a relevant value with net returns on shares?
- Are the residual income, the book value per share, and the earnings per share relevant with the share price?
- Are the residual income, the book value per share, and the earnings per share of a relevant value with the net returns on shares?

2. Literature Review and Study's Hypotheses

Magni, et al. [22] defined residual income as the value created on an investment over a specific period. Residual income is also known as the economic value added, abnormal returns, or extraordinary returns. Sandry and Rosa [23] stated that the use of return on investment and residual income had a significant impact on evaluating the financial performance of companies. Barth, et al. [24] indicated that the value relevance studies have recently been developed after earnings lost their value relevance, and the current studies should use new accounting information and performance metrics. Brown, et al. [25] investigated the impact of return on assets and residual income on risk-taking when making investment

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decisions. The study's results indicated that using return on assets led to riskier choices than residual income. Liu and Sun [26] investigated the impact of the COVID-19 pandemic on the value relevance of earnings. The study compared the discretionary accruals, the explanatory power, and the slope of the multivariate regression model. The results showed decreased discretionary accruals for 2019-2020, indicating companies' involvement in earnings management. The explanatory power also indicated a deterioration in the value relevance of earnings. Digdowiseiso [27] examined the impacts of some traditional accounting metrics, such as the capital adequacy ratio, non-performing loans, loan deposit ratio, and the return on assets, on the stock prices of 24 banks listed on the Indonesia Stock Exchange from 2015 to 2019. The results showed that all traditional accounting metrics collectively rather than individually had statistically significant impacts on stock prices.

Easton [28] discussed some methodological issues in market-based accounting studies, as accounting information from the balance sheet and the income statement can be used as independent variables, and share price as the dependent variable to explain the market reactions to the announcement of accounting information. In addition, the author discussed the use of accounting information as independent variables and share returns as the dependent variable to explain the usefulness of accounting information as a summary of the events that have affected the firm over the return period and, therefore, the inferences from returns -based regressions are probably better than share-prices- based regressions [29]. Investigated the value relevance of accounting information for the listed companies on the Ghana stock exchange. The results indicated that book value had a positive and statistically significant impact on the market value of shares, and earnings were found to be more relevant than book value.

Kumaran [30] Examined the efficiency of Saudi banks in creating value for shareholders from 2014 to 2020. The study used value-based performance measures to build an index of shareholders' value. The survey results indicated that residual income or economic value added was the most determinant of real economic profit, and that the high market value added gave investors a positive outlook on banks' future performance. Vijitha and Nimalathasan [31] examined the relevance of return on assets, earnings per share, book value per share, and the ratio of share price to earnings per share. The results indicated that all variables had significant correlations with the stock price [32]. Used the residual income to measure the financial performance of a sample of Croatian companies. The results indicated that only 8.11% of 148 companies achieved a positive residual income, with an average residual income of 6.8. At the same time, the capital deteriorated for the rest of the companies, recording a decrease of 8.26%.

Shubita [33] investigated the information content of the economic value added EVA, the accounting earnings metric, and the residual income metric as the independent variables and stock returns as the dependent variable. The results showed that the residual income was statistically insignificant with a weak explanatory value, recording an adjusted R-squared of 2%. Yudianti [34] investigated the value relevance of both earnings per share and book value per share. The results showed that they had a significant impact on the share price. However, the book value was more relevant than the earnings per share. Dimitrios, et al. [35] examined the relevance of the economic value added (EVA) and earnings per share. The results showed that earnings per share were more value-relevant than EVA, while the incremental information content results showed that EVA added massive explanatory power to earnings per share. Eljelly and Alghurair [36] examined the association between stock returns and some performance metrics for a sample of companies traded on the Saudi Arabia stock market (TASI). Metrics included earnings per share, return on equity, Cash Flow, and economic value added. The study found strong and statistically significant relationships between stock returns and all metrics except EVA.

Stark and Thomas [37] studied the relationship between residual income and market value of companies in the United Kingdom to investigate whether the residual income metric was better than the traditional profitability metrics used in planning and internal control. The results found no strong relationship between residual income and stock prices when associated with research and development expenditures and book value metrics, and this was better than the earnings metric, coupled with

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research and development expenditures and book value metrics. Forker and Powell [38] noted that, unlike [39] the traditional earnings metrics were superior to both the economic value added and the residual income regarding predictability and variability in measuring the quality of earnings. Chen and Dodd [40] investigated the relevance of traditional profitability, operating income, residual income, and economic value added. The results indicated that the three profitability metrics have informational content, and the monetary value added has no superiority in measuring the value relevance. Uyemura, et al. [41]; O'Byrne [42]; Lehn and Makhija [43] confirmed that the economic value added is better than the traditional accounting metrics in interpreting the changes in the company's value. In contrast, [39, 44] found that the economic value-added metric has less explanatory power than the residual income, the net operating profit, and the operating cash flow metrics. Therefore, the economic value-added metric is superior to traditional accounting metrics.

Ohlson [1] it is known as the price model or valuation model, which includes the earnings per share and the book value per share as determinants of share price, and an error term to account for other variables. Therefore, the study added the residual income as an additional accounting variable. Following [28] the study used a returns model to capture the overall impacts of the accounting information over the year. The study developed the following hypotheses based on the literature review and the variables of the Ohlson [1].

The Accounting information is of a relevant value with share prices.

The Accounting information is of a relevant value with shares returns

3. Methodology and Analysis of Results

The study aims to provide empirical evidence on the value relevance of traditional accounting variables included in Ohlson [1] versus the value relevance of the residual income metric using the price model and return model. The study applied to 10 Saudi banks registered on the Saudi Stock Exchange (TASI) from 2013 to 2022. The study employed a panel data method, utilizing secondary data gathered from banks' annual financial reports and Tadawul websites. The study used least-squares regression models to test the study's hypotheses. For confidentiality issues, the study has not disclosed the names of the banks under study. Instead, it used codes such as Z1, Z2…, and Z10 as proxies for banks.

3.1. Ohlson's Model Specification

To estimate the value relevance of accounting information, several studies such as Collins, et al. [45]; Oswald [46]; Tsoligkas and Tsalavoutas [47] and Shah, et al. [48] have adopted Ohlson [1] and Feltham and Ohlson [49]. According to the Ohlson [1] a firm's share price is a function of the book value of equity and the expected future residual income. The model utilizes financial information as the primary driver of companies' value, which is the function of book value and earnings. This approach motivated value relevance studies by using actual earnings and book values. The Ohlson model employed in this study used historical accounting information. The model assumes that the share price is a function of the book value per share at time t and current earnings at time t.

$$Pit = \alpha + BVit + Eit + \varepsilon it \quad (1)$$

Whereas: Pit the share price of the bank I after three months of the fiscal year-end, t; α= intercept; BVit =the book value per share of bank I at the end of year t, Eit the earnings per share of bank I during the year; εit =error term.

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3.2. Variables Specifications

Table 1.
Variables Measurement.

Variable Code	Variable Measurement
X1 BVS	Book value per share is calculated as End of period Shareholders' equity applicable to common shares / Number of common shares outstanding.
X2 EPS	Earnings per Share is calculated as Net income - Preferred dividends/ Average common stockholders.
X 3 RI	Residual income is calculated as Actual income minus the desired income by shareholders. The study used the capital assets pricing model to calculate the cost of capital.
Y1 SP	The study gathered Share prices from the Saudi Exchange three months after the end of each year, allowing investors to obtain the required information after auditing financial reports and their disclosure to the public [45, 50].
Y2 NAR	Net annual returns are calculated using the following formula: ∑ RDt -RDT-1/RDT-1

3.3. Sub-Hypotheses

The study developed sub-hypotheses to capture the individual value relevance of each independent variable and the collective value relevance of all independent variables, with share price and net annual returns on the shares as the dependent variables.

1. The book value per share is of a relevant value with the share price.
2. The earnings per share is of a relevant value with the share price.
3. The residual income is of a relevant value with the share price.
4. The book value, earnings per share, and residual income are of a value relevant with the share price.
5. The book value per share is of a relevant value with the net annual returns on shares.
6. The earnings per share are of a relevant value with the net annual returns on shares.
7. The residual income is of a relevant value with the net annual returns on shares.
8. The book value, the earnings per share, and the residual income are of a relevant value with the net annual returns on shares.

3.4. Model Specifications

The study developed the following models to test the study's hypotheses

$$Y\ a+b\ X+\in \quad (2)$$

Whereas: Y =Dependent Variable; a =Intercept; X= the Independent Variable; b = the Slope; ∈= the Residual (Error Term)

$$Y1Sp= a+b\ X1BVS \quad (3)$$

$$Y1Sp = a+b\ X2\ EPS +\in \quad (4)$$

$$Y1Sp = a+b\ X\ 3\ RI \quad (5)$$

$$Y1Sp = a+b\ X1BVS, bX2\ EPS, X\ 3b\ RI+\in \quad (6)$$

$$Y2\ NAR = a+b\ X1BVS+\in \quad (7)$$

$$SY2\ NAR\ R= a+b\ X2\ EPS +\in \quad (8)$$

$$Y2\ NAR = a+b\ X\ 3\ RI+\in \quad (9)$$

$$Y2\ NAR = a+b\ X1BVS, bX2\ EPS, bX\ 3\ RI+\in \quad (10)$$

3.5. Calculating Cost of Capital

The study employed the Capital Asset Pricing Model (CAPM), developed by Sharpe (1963), to quantify the relationship between the expected return and the risk of investing in securities. The expected return on a security is a function of the risk-free rate, market rate, risk premium, and Beta of the security. The model was widely used in calculating the cost of capital, which serves as a discount rate or hurdle rate to discount future cash flows generated by the assets.

The CAPM Formula is as follows:

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ER= RFR+ {(Beta (MR – RFR)) (11)

Whereas E.R. =Expected return on the security, i.e., cost of capital; RFR Risk-free rate; Beta stock risk factor. MR = Expected return of the index of the market; Risk Premium = (MR – RFR)

The study calculated Beta as follows:

Beta coefficient = Covariance (M.R., R.S.)/ Variance (M.R.) (12)

Whereas R.S. =the return on an individual share; M.R. = the return on the market as a whole; Covariance how changes in share returns relative to changes in the market returns; Variance = how far market returns were spreading out from their mean.

The study uses the following parameters to calculate the cost of capital.

The risk-free return: The study relied on the rate of return on government treasury bonds for ten years, which was recorded at 3.05%. %. Considering that investments in stocks are long-term investments, it is necessary to choose a long-term rate of return, unlike some previous studies that relied on short-term returns in U.S. $. The study used the Saudi government Treasury bond return as a proxy for the risk-free rate to compare returns on investments denominated in Saudi Arabian riyals (SAR). See Table 2.

Table 2.
FTSE Saudi Arabian Government Bond Index.

Periods	Average Coupon (%)
1-3 Years	2.83
3-5 Years	2.75
5-7 Years	2.9
7-10 Years	3.05
10+ Years	3.62

Source: FTSE Russell Factsheet | March 31, 2023.

Market return: The study used the average returns of the Saudi Stock Exchange Index (TASI), which recorded 0.053 during the study period, as a proxy for market return. See Table 3. Investing in stocks yields two types of returns: the first is to increase the stock's market value, and the second is to receive cash dividends that companies pay. Since it was difficult to determine the size of the dividends paid during the study period, the study relied on the returns of the market index.

Table 3.
TASI Share Returns Share Returns.

Year	FTSE share returns
2022	-0.07
2021	0.30
2020	0.04
2019	0.07
2018	0.08
2017	0.002
2016	0.04
2015	-0.17
2014	-0.02
2013	0.26
Average	5.3

Source: https://www.mubasher.info/markets/TDWL.

Beta: It measures the volatility or systematic risk of a security compared to the market index.

Table 4 showed that Beta coefficients for all banks under study were greater than 1; that is, shares of banks added more market risks to the market index. Beat equal 1 suggests that the volatility of the share is the same as that of shares included in the market index. A beta value greater than 1 indicates

that the volatility of the share is higher than the volatility of shares included in the index. A beta value of less than 1 indicates that the share's volatility is lower than the shares included in the index.

Table 4.
Beta Calculations.

Years	Banks	Covariance	variance	Beta
2022	Z1	0.034284748	0.0178	1.926092
2021	Z2	0.144047479	0.0178	8.092482
2020	Z3	0.04704385	0.0178	2.642889
2019	Z4	0.061468122	0.0178	1.664964
2018	Z5	0.021001404	0.0178	3.453234
2017	Z6	0.042227644	0.0178	2.372318
2016	Z7	0.058456747	0.0178	3.284057
2015	Z8	0.056544837	0.0178	3.176648
2014	Z9	0.056544837	0.0178	2.495158
2013	Z10	0.044414204	0.0178	1.878043

Source: calculations by the researcher based on secondary data from https://www.saudiexchange.sa/.

According to the Capital Asset Pricing Model (CAPM), the cost of equity is calculated using the following equation: K RF + B (RM-RF). Whereas k stands for cost of capital, RF stands for risk-free rate, B stands for beta, and RM-RF stands for equity risk premium. (Table 5) showed the calculated cost of capital for each bank for each year.

Table 5.
Calculation of Cost of Capital.

Years	Banks	Risk free rate(Table 2)	Beta Table (4)	Market returns	Cost of capital
2022	Z1	0.0305	1.926092	0.053	00.07383707
2021	Z2	0.0305	8.092482	0.053	0.212580845
2020	Z3	0.0305	2.642889	0.053	0.089965003
2019	Z4	0.0305	1.664964	0.053	0.06796169
2018	Z5	0.0305	3.453234	0.053	0.108197765
2017	Z6	0.0305	2.372318	0.053	0.083877155
2016	Z7	0.0305	3.284057	0.053	0.104391283
2015	Z8	0.0305	3.176648	0.053	0.10197458
2014	Z9	0.0305	2.495158	0.053	0.0.086641055
2013	Z10	0.0305	1.878043	0.053	0.072755968

Source: Cost of Capital Calculated by the Researcher Using Beta Estimates, Risk-Free Return, Market Return.

3.6. Analysis of Results

To check for Multicollinearity among the independent variables, Table 6 shows a correlation coefficient of 0.615176032 between the book value per share and earnings per share. Therefore, the study examined Multicollinearity using the VIF test, which determines the strength of correlation between the independent variables. VIF tests recorded a Score of 1.393906728. The correlation was moderate, and there is no need to investigate it further.

Table 6.
Correlation Coefficient.

	Book Value Per Share	Earnings Per Share	Residual Income	Share Price	Net Annual Returns
Book Value Per Share	1				
Earnings Per Share	0.615176032	1			
Residual Income	0.23561999	0.370576503	1		
Share Price	-0.081358708	0.03679298	0.11031	1	
Net Annual Returns	0.53159372	0.46872295	0.35403	0.2863	1

Source: The dependent variable is the book value per share.

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According to Table 7, the results showed that model 3 was statistically significant as per the F test, which recorded 38.60285933, and as per the Adjusted R Square, the model explained 0.282591884 of the changes in the share price. In addition, the book value per share had a positive and statistically significant correlation with the share price, as indicated by the t-statistic and p-value. Model 7 showed that the model was statistically insignificant; the book value per share alone had no impact on the net annual returns. Based on the results, the study accepted the alternative first hypothesis 1 and rejected hypothesis 5.

Table 7.
Results of Models 3, 7.

Price Model 3			**Return Mode 7**	
	Multiple R	0.5315937	Multiple R	0.08135870
	R Square	0.2825918	R Square	0.00661923
	Adjusted R Square	0.2752713	Adjusted R Square	-0.00351729
	Standard Error	13.139018	Standard Error	0.24139983
	F	38.6028593	*F*	0.65300787
	Significance F	0.00000	*Significance F*	0.42099657
Anova	t Stat	P-value	t Stat	P-value
Intercept	0.42663140	0.6705835	2.27766769	0.0249190
Book Value Per Share	6.21311993	0.00000	-0.80808902	0.4209965

Source: Dependent Variables: Share Price, Net Annual Returns on Shares.

According to Table 8, the results showed that model 4 was statistically significant as per the F test, which recorded 27.59291488, and as per the Adjusted R Square, the model explained 0.219701206 of the changes in the share price. In addition, the earnings per share alone had a positive and statistically significant correlation with the share price, as indicated by the t-stat and p-value. However, model 8 results showed that the model was statistically insignificant; that is, the earnings per share alone had no impact on net annual returns. Based on the results, the study accepted the hypothesis 2. That is, the earnings per share alone had value relevance with share price, and rejected the hypothesis 6.

Table 8..
Results of Models 4, 8.

Price Model 4			**Return Model 8**	
	Multiple R	0.46872295	Multiple R	0.0367929
	R Square	0.21970120	R Square	0.0013537
	Adjusted R Square	0.21173897	Adjusted R Square	-0.0088365
	Standard Error	13.7028295	Standard Error	0.2420387
	F	27.59291488	F	0.1328447
	Significance F	0.00000	Significance F	0.7162857
Anova	t Stat	P-value	t Stat	P-value
Intercept	4.454083	0.00000	1.9385183	0.05543714
Earnings Per Share	5.252896	0.00000	0.3644787	0.71628579

Source: Dependent Variables: Share Price, Net Annual Returns on Shares.

Table 9 showed that model 5 was statistically insignificant according to the F-test, which yielded a value of 1.975944514, and the Significance of F, which was also 1.9759445. The residual income alone had no statistically significant impact on the share price, as per-value, which recorded 0.162981. In addition, the results of model 9 showed that the model was statistically insignificant; that is, the residual income alone had no statistically significant impact on the net annual returns. Based on the results, the study rejected hypotheses 3 and 7.

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Table 9.
Results of Models 5, 9.

Price Model 5			**Return Model 9**	
	Multiple R	0.1405852	Multiple R	0.1567780
	R Square	0.0197642	R Square	0.0245793
	Adjusted R Square	0.0097617	Adjusted R Square	0.0146260
	Standard Error	15.358367	Standard Error	0.2392076
	F	1.9759445	F	2.469474
	Significance F	0.1629807	Significance F	0.1192999
Anova	t Stat	P-value	t Stat	P-value
Intercept	11.4358	0.00000	2.4351516	0.01669343
Residual Income	1.405683	0.162981	1.5714561	0.11929990

Source: Dependent Variables: Share Price, Net Annual Returns on Shares.

Table 10 presents the results of models 6 and 10, which capture the collective impact of book value per share, earnings per share, and residual income. The results showed that model 6 was statistically significant, as indicated by the F-test value of 0.00000, and the model explained 0.3487227 of the changes in share price, as indicated by the adjusted R-squared value. In addition, all independent variables were statistically significant, as noted in the P-values, and positively impacted the share price, as shown by the statistics. The results showed that the model 10 was statistically significant, as indicated by the F-test value of 2.340713726, and the model explained only 0.068161476 of the changes in the net annual returns, as indicated by the adjusted R-squared value. Additionally, the P-value indicated all independent variables were statistically significant. In addition, earnings per share and the residual income positively impacted net annual returns as per the t-statistic. However, the book value per share negatively impacted the net yearly returns, as indicated by the t-statistic at -1.90304492.

Table 10.
Results of Models 6, 10.

Price Model 6			**Return Model 10**	
	Multiple R	0.6070077	Multiple R	0.2610775
	R Square		R Square	0.0681614
	Adjusted R Square	0.3487227	Adjusted R Square	0.0390415
	Standard Error	12.4554148	Standard Error	0.2362255
	F	18.669661	F	2.3407137
	Significance F	00000	Significance F	0.07813316
Anova	t Stat	P-value	t Stat	P-value
Intercept	-0.44775701	0.6553373	1.52673324	0.1301154
Book Value Per Share	2.88232504	0.0048710	-1.90304492	0.0600309
Earnings Per Share	3.19329016	0.0019026	1.94689199	0.0544704
Residual Income	2.85342210	0.0052980	2.25614532	0.0263305

Source: Dependent Variables: Share Price, Net Annual Returns on Shares.

In 2022, the Saudi market index declined by 0.07%- see Table 3 -due to uncertainty regarding the global economic recession, the repercussions of international interest rate hikes, and fluctuations in oil prices. Therefore, the Saudi Central Bank raised interest rates seven times. The increase in interest rates in the Kingdom decreased the attractiveness of investing in the stock market. Table 11 indicated that the banks achieved better returns on shares during all the years of the study, except in 2015 and 2020, compared to the market index returns during the study period. However, higher returns by banks produced high risks as the beta parameters for all banks were above one. In 2015, the return on shares declined by about -2.710%, while the stock index returns decreased by only -0.17%. In 2020, banks achieved negative returns on shares by -0.693, while the market index achieved positive returns of 0.04.

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Table 11.
Net Annual Returns for Banks.

Years	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10	Total Annual Returns
2022	0.225	0.225	0.129	0.218	0.393	-0.133	0.315	0.225	0.355	-0.205	1.747
2021	0.321	0.368	0.186	0.317	0.143	0.705	0.522	0.522	0.414	0.421	3.920
2020	-0.122	-0.056	-0.154	-0.259	-0.249	0.158	0.104	0.104	-0.126	-0.091	-0.693
2019	0.208	0.068	0.030	0.105	0.283	0.166	0.244	0.244	0.112	0.058	1.518
2018	-0.005	0.236	0.115	0.232	0.311	0.307	0.317	0.317	0.211	0.295	2.337
2017	0.089	0.180	0.047	0.112	0.131	0.047	0.006	0.006	0.254	0.064	0.936
2016	-0.056	-0.089	-0.080	0.056	-0.029	0.193	0.055	0.055	0.070	-0.133	0.041
2015	-0.295	-0.481	-0.434	-0.415	-0.224	0.069	-0.311	-0.311	-0.274	-0.032	-2.710
2014	0.189	0.014	-0.043	0.315	0.180	-0.241	0.308	0.308	0.382	0.132	1.545
2013	0.250	1.073	0.433	0.406	0.183	0.120	0.504	0.504	0.157	0.132	3.762

Source: calculations by the researcher based on secondary data from https://www.saudiexchange.sa/

Table 12 shows that some banks achieved negative residual income due to their higher cost of capital calculated based on beta estimates.Seet table 3 and 4. However, these banks achieved higher returns on equity, which was considered non-sensitive to market risk. This explains the difference between the accounting return on equity, which does not capture market risks, and the residual income metric, which is considered a market risk-adjusted metric.

Table 12.
Residual Income Values.

Year	Z1	Z2	Z3	Z4	Z5	Z6	Z7	Z8	Z9	Z10
2022	2,462	(2,157)	(325)	(14)	(2,147)	(1,244)	8,613	5,344	247	3,224
2021	1,752	(1,665)	(662)	(45)	13,567	(995)	7,371	5,500	43	5,143
2020	806	(2,690)	(595)	(1,434)	(11,507)	(946)	4,099	513	(483)	4,954
2019	2,133	(1,645)	(1,271)	327	(1,445)	(796)	3,997	5,861	212	5,228
2018	995	(1,075)	(146)	27,442	(1,663)	645	3,222	165	297	4,234
2017	307	(1,047)	(112)	32,543	(134)	489	1,387	8,449	(81)	4,256
2016	(197)	(906)	(300)	1,107	312	454	2,207	(615)	(500)	4,124
2015	625	(177)	(4)	1,631	618	760	1,807	55	(487)	4,678
2014	1,089	(797)	283	1,416	(1,163)	1,899	1,962	229	(572)	4,741
2013	867	(461)	232	353	1,151	619	2,208	185	(813)	4,235

Source: values calculated by the researcher using beta estimates, risk-free return, market return - (Amounts in Millions)

4. Discussion and Conclusions

This study aimed to provide empirical evidence on whether the residual income, as a market risk-adjusted metric, is of a relevant value, primarily because some previous studies have provided mixed results. To achieve this goal, the study used two dependent variables to measure the value relevance of the independent variables. The study utilized share prices to capture the informational content of accounting information after banks in the Kingdom disclosed their annual financial reports. In addition, it employed net yearly returns to assess the impact of all events during the year. The study employed Sharpe's capital asset pricing model to calculate the cost of capital, thereby measuring the residual income model. According to the latest estimates, the risks associated with the Saudi Stock Exchange stock index were lower than those associated with the net annual returns of banks. However, the returns of banks were better than the index returns. The high beta parameters increased the cost of capital for all banks as, some banks realized negative residual incomes. The study used the panel data method and the least squares models to test the study's hypotheses. The results of the models to quantify the individual value relevance of the independent variables on the share price as the dependent variable showed that both the book value per share and the earnings per share had value relevance. However, the residual income is not of a revenant value. The book value per share is more favorable than the earnings per share, as the former exhibits an explanatory power of 28% compared to 21.8% for

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the latter. The results have been supported by Liu and Sun [26] and Yudianti [34]. However, the results contradict the results of Badu and Appiah [29]. The results of the models to quantify the individual value relevance of the book value per share, the earnings per share, and the residual income as independent variables and the net annual returns on shares- return model- as the dependent variable showed that both the book value per share and the earnings per share had value relevance [31]. Provided the same results. The residual income is not of a relevant value. Shubita [33] provided empirical evidence that the residual income is irrelevant to the share price. Also, Eljelly and Alghurair [36] showed that the economic value added or the residual income had no relationship with stock returns for the Saudi companies. The results of the models, which quantified the collective value relevance of the book value per share, earnings per share, and residual income as independent variables and the share price as the dependent variable, showed that the book value per share, earnings per share, and residual income are of a relevant value. Kumaran [30] confirmed the superiority of residual income as the best value-creation metric. Dimitrios, et al. [35] Stated that the residual income added explanatory power to earnings. Stark and Thomas [37] confirmed that the residual income had value relevance when simultaneously added to the other accounting information and had no value relevance alone. The results of the models to quantify the collective value relevance of the book value per share, earnings per share, and residual income as the independent variables and the net annual returns –return model -as the dependent variable showed that the book value per share, the earnings per share and the residual income are of a relevant value and the price model is better than the return model. The study's results provided empirical evidence that investors rely on the accounting information published on the financial statements and the residual income metric.

Study's Contributions

The current study is the first to discuss the value relevance of the residual income metric compared to the traditional accounting information, as it confirmed that the residual income metric complements other traditional accounting metrics rather than being a substitute for them. The results of the study also revealed that the traditional accounting metrics are flawed because it overestimate the performance as they do not take into account risks, in addition, the results of the study showed that the residual income metric is, a market risk- adjusted metric, that shows that market risk- adjusted performance of Saudi banks is less than non-market risk- adjusted the performance.

Study's Limitations

The study employed the case study approach of the phenomenon under study, however, the results derived from the case study approach enable in-depth analysis non generalizable. Therefore, the study recommends expanding the scope of the current study by conducting cross–country future studies.

Transparency:

The author confirms that the manuscript is an honest, accurate, and transparent account of the study; that no vital features of the study have been omitted; and that any discrepancies from the study as planned have been explained. This study followed all ethical practices during writing.

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