

Article

Can Accounting Value Relevance and Pricing Error Influence Stock Price of High-Technology Service Enterprises?

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Abstract: This study examines whether relevant accounting ratios influence the stock prices of high-technology service enterprises in five countries, namely, the United States, Japan, China, the United Kingdom, and France. Subsequently, this study determines the existence of pricing error (if any) between the intrinsic value and the market value of the stock price due to the accounting ratios. Content analysis was performed on the annual reports of 326 high-technology service enterprises to determine the effect of three accounting ratios, namely diluted earnings per share, revenue per share, and book value per share, on the stock price of the high-technology service enterprises. This study shows that diluted earnings per share and book value per share influence the stock price of high-technology service enterprises. However, this study shows revenue per share does not influence the stock price of high-technology service enterprises. In addition, this study shows that, on average, the pricing error of high-technology services enterprises is considered moderate, with some countries exhibiting higher pricing errors. This study provides insight into how much accounting ratios can influence the movement of stock prices and, in turn, assist investors in understanding the key metrics within the high-technology industry.

Keywords: intrinsic value; stock price; pricing error; earnings per share; book value per share; revenue per share; high-technology service enterprises



Citation: Sukmadilaga, Citra, Jose Christian Santoso, and Erlane K. Ghani. 2023. Can Accounting Value Relevance and Pricing Error Influence Stock Price of High-Technology Service Enterprises? *Economies* 11: 48. <https://doi.org/10.3390/economies11020048>

Academic Editors: Ralf Fendel and Angela Roman

Received: 25 November 2022

Revised: 5 January 2023

Accepted: 30 January 2023

Published: 2 February 2023



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1. Introduction

Accounting has a long history throughout human civilization, which can be traced through the first-ever recorded bookkeeping records in ancient times (Keiso 2014). The focus of accounting is on the financial reporting process, which involves identifying, measuring, and communicating financial information via financial reports, which consist of financial statements and other disclosures. In preparing the financial statements, two types of assumptions are used, namely, cash basis and accrual basis. While cash-based reporting is based on the inflows and outflows of cash in a particular period, accrual-based accounting sees the effect of transactions and other related events on the entity's assets and claims during the related period that it is affected, regardless of whether there is cash inflow or cash outflow during that particular period (Scott 2009). The information provided in the financial statements can then be used by internal and external users for decision-making purposes. For external users such as investors, financial reports are meant to assist them in making investment decisions (Keiso 2014). Often, these investors would perform prospective analysis based on the accounting information, which includes forecasting and valuation of stock (Palepu et al. 2013).

During the 1990s, many investors felt that accounting information had lost its relevance during the dot-com bubble as many technology shares were traded at record-high multiples, and many technology enterprises did not earn any earnings at all. Some argued that historical earnings are starting to become irrelevant as historical earnings may not be

able to indicate future earnings (Penman 2003). Several studies have suggested that financial statements may have lost their value relevance due to a shift within the economy from the traditional capital-intensive economy to a high-technology, service-oriented economy (Dontoh et al. 2004). However, there are studies that reported little to no change in value relevance in terms of earnings and book value over the past 40 years (Collins et al. 1997). Therefore, the question of accounting value relevance arises to assess the relevance of historical accounting performance to investors' judgment within the stock market, especially within the high-technology industry where stocks are typically traded with high earnings multiples.

This study aims to examine the influence of relevant accounting ratios, namely, the Earnings per Share (EPS), Revenues per Share (RPS), and Book Value per Share (BVPS) on the stock price of high-technology service enterprises. Subsequently, this study determines the existence of pricing error (if any) between the intrinsic value and the market value of the stock based on the relevant accounting ratios. The findings of this study can provide a better understanding of stock valuation within the high-technology industry. The next section, Section 2, provides the literature review relevant to this study. This is followed by Section 3, which explains the research methodology. Section 4 presents the results and discussion. The final section, Section 5, concludes this study.

2. Literature Review

2.1. Stock Price

Stock represents an underlying value of a company, which indicates that each stock is not just a ticker symbol or an electronic one (Graham 1973). The stock price of a company represents how much the stocks of a company are being traded in the stock exchange and often reflects all available information (Malkiel 2003). Investing in the stocks of a company is said to commit funds to one or more assets that will be held over some future period (Jones 2014). The act of investing is different than mere speculation (Graham 1973). The key difference between investment and speculation is that investing activities know the underlying business thoroughly, whereas speculation does not. Investing involves a thorough analysis of the underlying business before the stock purchase, protecting oneself from serious losses, and aspiring to have an adequate and not spectacular performance (Woods 2022). The accounting information presented by the financial statements represents accrual information, which may provide investors with more relevant information, but also a higher risk of irrelevant information due to management manipulating the accounting numbers (Hung 2000).

The value relevance approach indicates that investors can create their judgments regarding their predictions of future investment returns into the company instead of relying solely on the financial statements (Scott 2009). This allows them to absorb the information in the financial statements provided by the reporting companies. In addition, value relevance can assist accountants in identifying which information is valued more by investors (Barth et al. 2022). The effect of value relevance can be measured by the effect of accounting information disclosure on the share price performance. This happens as each investor reacts differently to the announcements of accounting information (Scott 2009), which are:

1. Investor's prior belief on the company's performance based on financial information, such as dividends, cash flow, and/or earnings, which may change after further accounting information has been disclosed.
2. The deviation between investors' earnings expectations and actual earnings.
3. Changes within investors' investment plan on the companies after their earnings disclosure.
4. The difference in trading volume after the companies' earnings announcement.

In determining value relevance, often, investors and analysts would select ratios that can be used to determine stock price. Among the ratios is EPS, which is considered a company's net earnings (Barth et al. 2022). Another ratio is the RPS, which represents the

revenue generated from growth stocks and value growth over profitability (Kama 2009). BVPS is also a common ratio used in valuing stock price, which is defined as the fair value of all equity claims (IASB 2013). These three ratios are seen to be significant factors in valuing stock price (Barth et al. 2022). Barth et al. (2022) found that the value relevance of accounting information does not decline; rather, it is a mix of various financial ratios and not one single ratio, such as net earnings.

Studies in the accounting literature posited that in order to properly analyze and understand the underlying business, investors need to understand a company's daily operations, revenue streams, cost structure, industry, and other relevant factors that come into play within the company's profitability (Piotroski 2000). Thus, in the world of investing, there is a view called value investing. Value investing involves valuing and estimating a stock price based on the value of the underlying company (Greenwald et al. 2001). It is made up of the process of analysis of the company and accounting statements to gain an understanding of the company, which then leads to the financial analysis of the company to evaluate the current business performance. Subsequently, this then leads to forecasting to estimate future business performance and ends with a valuation of the company to gain a fair estimate of the business' value (Piotroski 2000). The use of intrinsic value within an investment decision process formulation is due to the expectation that the company's future performance will be discounted to its present value using a certain rate of return, which allow analysts to determine the company's intrinsic value. Palepu et al. (2013) suggested that valuing stock price is important as stock tends to be closer to its intrinsic value over a long period of time. As a consequence, the use of intrinsic value and margin of safety reflects a gap needed for margin of error within the investing decision (Montier 2011).

Palepu et al. (2013) proposed the present value approach to stock valuation. There are two valuation models, namely, the discounted cash flow model and the relative valuation model. Discounted cash flow model can be categorized into three types. The first is the discounted cash flow model, which is based on the cash flow generated in years to come. The second type is the discounted dividend model, which is based on the amount of dividend provided to the investors and the last type of discounted cash flow model is the free cash flow model, which is based on the cash flow. The relative valuation model, on the other hand, values the company by using multiples valuation, such as using EPS and BVPS within one industry. Multiples valuation can be defined as a method to determine a company's equity value based on how the market prices are for comparable companies or transactions. In order to do this, analysts typically create an approximation of the company's equity value based on the market value of a peer group (Schreiner 2007).

The underlying theory of valuation multiples is the law of one price, which states that on an efficient market, similar assets would be traded at a similar price (Esty 2000). In practice, there are four steps in doing the valuation multiples, which are:

1. Selection of value-relevant measures;
2. Identification of comparable companies;
3. Estimation of synthetic peer group multiples;
4. Actual valuation.

Several studies have used the relative valuation model to examine stock prices. For example, Alford (1992) used the relative valuation model in stock valuation and found a more accurate valuation for large companies compared to small companies. Similarly, Schreiner (2007) found that using multiple valuations provides a more comprehensive framework for valuing stock prices. However, a group of studies opined that stock valuation is no longer relevant in evaluating stock prices in certain industries (Ciftci et al. 2014), such as the high-technology industry. The high-technology industry refers to an industry that enables innovation through complex and dynamic technology in various fields, such as IT, telecommunications, biotechnology, and others (Zhou et al. 2017). The high-technology industry has evolved for decades and increased its dominance within various economic sectors. This can be seen as many technology enterprises dominate the largest companies globally, such as Google, Apple, and Amazon. The increase in the dominance of technol-

ogy enterprises can be seen in the 2000s; both pharmaceutical and technology companies account for 40% of the value of the SNP500 (Zhou et al. 2017). As a consequence, investors have started to focus on technology enterprises as more investors are starting to notice the potential of technology companies as they provide a higher period of growth compared to conventional companies in other industries.

2.2. High-Technology Industry and Stock Price

The high-technology industry is distinguished by its role as an enabler of innovation through the use of sophisticated and ever-evolving technologies in sectors as diverse as information technology (IT), telecommunications (telecom), biotechnology, and others (Zhou et al. 2017). Over the course of several decades, the high-tech industry has expanded, gradually taking the lead in many other parts of the economy. Both pharmaceutical and technology firms contribute 40% of the SNP500's value, demonstrating the increasing importance of technology companies in the current decade (Ciftci et al. 2014). For this reason, investors are shifting their attention to technology firms since they are becoming increasingly aware of the potential offered by these firms, which often experience a more rapid period of growth than more traditional firms operating in other industries. It has been discovered, however, that earnings, book values, and cash flows are not sufficient on their own in evaluating intangible-intensive organizations such as technology firms, suggesting that traditional accounting metrics may no longer be applicable to analyzing high-tech firms (Ciftci et al. 2014).

Studies have found that traditional accounting figures may no longer be relevant to evaluating high-technology enterprises as earnings, book values, and cash flows are irrelevant on a stand-alone basis in evaluating intangible-intensive enterprises, such as technology service enterprises (Ciftci et al. 2014). However, it is believed that accounting ratios, such as EPS and BVPS, can still be used to value new economy companies with a higher variation (Core et al. 2002). Other researchers also argued that accounting value relevance has not declined over the years but rather has become more diversified among various financial ratios rather than being concentrated on the earnings of the company (Barth et al. 2022). Studies such as Amir and Lev (1996), as well as Lev and Zarowin (1999), suggested a shift towards intangibles may make accounting information less relevant to stock prices.

According to Syamsuddin (2002), EPS is a financial ratio that illustrates how much return is obtained by investors or shareholders per share by dividing net income after tax by the number of ordinary shares outstanding. It can be used to determine the degree of corporate value that assesses a company's success in generating profits for its shareholders. Based on its ability to characterize the company's future earning prospects, EPS information is regarded as the most fundamental and relevant data (Ammy and Azizah 2021). A higher earnings per share (EPS) indicates a higher profit for shareholders, which in turn increases the attractiveness of the stock to potential buyers. Studies that have examined the link between EPS and stock prices have shown that EPS influences stock prices (Syamsuddin 2002; Dontoh et al. 2004; Ammy and Azizah 2021). For example, Ammy and Azizah (2021) examined the effect of EPS on stock prices in construction companies listed on the Indonesia Stock Exchange. They found that EPS significantly affects the stock prices in construction companies. Consistent with previous studies, this study also hypothesized that EPS can influence stock prices. Therefore, the following hypothesis is developed:

H1. *The companies' EPS has a significant positive correlation with the companies' stock prices.*

RPS is a financial ratio used to measure performance over a specific time frame, such as a quarter, semi-year, year, or the most recent twelve months. RPS is divided by the average number of shares outstanding to obtain earnings per share. RPS is often considered an indicator of earnings persistence (Jegadeesh and Livnat 2006) and has relatively high autocorrelation (Ertimur et al. 2003). Studies have suggested that early revenue recognition could have an effect on a company's stock price if it causes analysts and investors to

alter their projections for the company's earnings growth rate upward (Xu and Cai 2006). Xu and Cai (2006) examined the effect of aggressive revenue recognition on stock prices. They found that revenue which can be measured as RPS significantly influences stock prices. They argued that this somewhat motivates the management to adopt aggressive and even fraudulent revenue recognition practices. However, not many studies have confirmed the findings of Xu and Cai. Thus, this study aims to examine whether the RPS of high-technology enterprises influences their stock price. The following hypothesis is developed:

H2. *The companies' RPS has a positive correlation with the companies' stock prices.*

BVPS is a financial ratio used to calculate the book value of a share in a company based on the ordinary shareholders' equity in the company. Book value, as opposed to market value, is the difference between a company's assets and liabilities (Hayes 2022). BVPS is a ratio used to determine the company's book value per share. Most of the studies that have examined the link between BPVS and stock prices found that BVPS has a direct and position influence on stock prices (Shehzad and Ismail 2014; Khan et al. 2012). For example, Khan et al. (2012), in their studies, showed that BVPS significantly influenced stock prices in the Karachi Stock Exchange in Pakistan for the period of 2005–2011. In addition, they also found that BVPS has more explanatory power compared to earnings yield and dividend yield. Similar findings were found by Menike and Prabath (2014). They found that BVPS had a significant influence on the stock prices of 100 companies listed in the Colomba Stock Exchange from 2008 to 2012. Following these studies, this study aims to examine the influence of BVPS on stock prices in high-technology service enterprises in five countries. Therefore, the following hypothesis is developed:

H3. *The companies' BVPS has a positive correlation with the companies' stock prices.*

In sum, this study attempts to determine whether EPS, RPS, and BVPS remain strong indicators and are positively correlated with the stock price movement. This aim is in line with previous studies that implied a positive correlation between EPS, RPS, and BVPS on the stock price movement (Dontoh et al. 2004; Hung 2000; Ciftci et al. 2014).

3. Research Methodology

3.1. Sample Selection

The high-technology services enterprises across five countries are selected as the sample in this study. The five countries are the United States, Japan, China, the United Kingdom, and France. These countries are selected as they are the top 5 largest stock exchanges in the world. The high-technology service enterprises are made up of Software-application, Software-Infrastructure, and Information Technology Services sectors. As of 2021, there are 1757 companies, comprising 897 companies from the United States, 371 companies from Japan, 222 companies from China, 197 companies from the United Kingdom, and 64 companies from France. In determining the sample size, this study utilized the Slovin method, which can be expressed through the following equation:

$$n = \frac{N}{1 + Ne^2}$$

n = Minimum sample size

N = Total populations

e = Margin of error

Assuming a margin of error of 5% and a total population of 1757, it can be estimated that the minimum sample size for this study is 325.82 @ 326. After determining the minimum sample size, the sample is then proportioned to each country, as shown in Table 1.

Table 1. Determination of sample size.

Country	Total	Proportion	N
United States	897	51%	167
Japan	371	21%	69
China	222	13%	41
United Kingdom	197	11%	37
France	64	4%	12
Total	1757	100%	326

3.2. Research Instrument and Data Collection

This study used content analysis on the annual reports of the high-technology services enterprises of five countries. Specifically, this study utilized the 2021 financial reports as the year 2021 experienced the COVID-19 pandemic year-round compared to 2020 when the stock market panic happened. The content analysis was performed to extract relevant information from the annual reports and, subsequently, calculated to derive the required ratios, namely, EPS, PRV, BVPS, and stock price. In total, this study collected data from 326 high-technology services enterprises across five countries. The data were then analyzed using STATA. Table 2 provides the variable measurements for the variables.

Table 2. Variable Measurement.

Variable	Indicator	Scale
EPS	$\frac{\text{Net Profit}}{\text{Outstanding Shares}}$	Ratio
RPS	$\frac{\text{Revenue}}{\text{Outstanding shares}}$	Ratio
BVPS	$\frac{\text{Book Value}}{\text{Outstanding Shares}}$	Ratio
Stock Price	Closing stock price at the deadline of financial statements' submission on each stock exchange in each country	Ratio

4. Results and Discussion

4.1. Data Analyses

Table 3 presents the descriptive statistics for the high-technology services enterprises in all five countries. The minimum Diluted EPS amount in the total sample is at—USD 30 by a company in the United States known as ACWRF due to having a net loss of USD 3.2 million with 106.633 shares outstanding, possibly due to its loss on selling financial security in 2021. On the other hand, the maximum Diluted EPS amount in the total sample is at USD 23.7 by SHOP, a United States company, due to its potential recent increase in earnings on FY20-21 from USD 0.3 million to USD 2.9 million, supported by the performance of its merchants within the Shopify digital ecosystem and a sale of financial security. In addition, the mean and standard deviation for the Diluted EPS in the total sample is at USD 0.29 and 4.32, respectively.

Table 3. Descriptive Statistics of Accounting Ratios and Stock Prices.

	N	Min	Max	Mean	SD
RPS	326	-	270.40	11.09	27.35
Diluted EPS	326	(30.00)	23.70	0.29	4.32
BVPS	326	(44.20)	223.17	7.68	18.10
Sample Stock Price (USD)	326	0.00	675.96	33.48	74.57

Source: Data Analysis.

The minimum RPS amount in the total sample is USD 0 for some companies, such as JG, EMBK, IPSI, FCTI, ZEUCF, ZIMCF, and FDMSF in the United States. This is because

these companies are either acquired too small and have yet to prove their ability to earn any revenue or acquired by a bigger company and are placed within the bigger companies' cost center, rather than the revenue center. This also indicates easier access to the stock market in the United States compared to other countries. It may be more common for small companies that are still in the development stage to do an IPO in the United States compared to other countries. It may also be supported by the investors in the United States that are keen to invest in the stock market, compared to other countries that may not have capital as big as the investors within the United States or to invest in other investment vehicles. On the other hand, the maximum amount of RPS at USD 270.39 by NSIT is due to an increase in revenue in FY19-FY21 at USD 7.73 billion, USD 8.34 billion, and USD 9.43 billion, respectively. In addition, the RPS mean and standard deviation for the total sample are at USD 10.73 and 24.82, respectively.

The minimum BVPS amount in the total sample is at—USD 44.2 by MCFE due to its 2021 net equity, and outstanding shares amounts are at—USD 8.2 billion and 186.306 K, respectively. On the other hand, the maximum amount of BVPS in the total sample is at USD 90.8 by SHOP due to the total amount of book value and outstanding shares at USD 11.1 billion and 122.554 K, which is in line with the increase in revenue and net profit. In addition, the mean and standard deviation of the BVPS in the total samples are USD 7.68 and 18.10, respectively. The minimum of the sample stock price is at USD 0.0006 by FDBL, possibly due to its low RPS, Diluted EPS, and BVPS figures at USD 0.01,—USD 0.01, and—USD 0.01, respectively. On the other hand, the maximum amount of the sample stock price is at USD 675.96 by SHOP, which is supported by good RPS, Diluted EPS, and BVPS figures at USD 10.95, USD 23.66, and USD 90.84, respectively. In addition, the mean and standard deviation of the sample stock price are USD 33.48 and 74.57, respectively.

4.2. Preliminary Analyses

To create a good regression model, this study performed the multicollinearity test to determine whether the independent variables are highly correlated with each other. Table 4 shows the VIF value for all the independent variables is less than 10.00. In addition, the tolerance level is more than 0.01, which indicates that multicollinearity does not exist within the regression model.

Table 4. Multicollinearity Test.

Variables	Collinearity Statistics	
	Tolerance	VIF
RPS	0.535	1.46
Diluted EPS	0.798	1.42
BVPS	0.54	1.08

Source: Stata.

This study also performed the heteroscedasticity test to determine the presence of heteroscedasticity within the variables that can lead to the data not being reliable enough to be analyzed since the data are not distributed in a clear linear line (Creswell 2014). This study employed the Glejser test, which uses the absolute value of residuals obtained from LSM (Least-Squares Method) regression (Furno 2005). The parameter that was used within this test is Prob > Chi2 value. If the Prob > Chi2 is more than 0.05, the variables have homoscedasticity, while if the Prob > Chi2 value is less than 0.05, the variables have heteroscedasticity. Table 5 shows that all of the variables pass the heteroscedasticity test, which is reflected through the Prob > Chi2 value for all of the variables being less than 0.05. This indicates that heteroscedasticity exists within the model.

Table 5. Heteroscedasticity Test.

	Results
Chi2(1)	634.88
Prob > chi2	0.000

Source: Stata.

This study then proceeded to perform the normality test. Table 6 shows that the variables used in this study, namely, stock price, RPS, diluted EPS, and BVPS, are not normally distributed.

Table 6. Normality Test.

	Statistic	Kolmogorov–Smirnov df	Sig.
Sample stock price (USD)	0.365	326	0.000
RPS	0.343	326	0.000
Diluted EPS	0.273	326	0.000
BVPS	0.277	326	0.000

Source: Stata.

Since this study has 326 samples (>30 samples), it fulfills the Central Limit Theory (CLT), as the data are assumed to be normally distributed despite not passing the normality test. The last preliminary test performed is the linearity test. This test was used in this study in order to determine whether there is a significant linear correlation between the independent and dependent variables. Based on Table 7, it can be seen that RPS does not have any linear relationship with the sample stock price. However, it is believed that the use of the heteroscedasticity-robust method makes the sample valid in large sample sizes (Sloczyński and Wooldridge 2018).

Table 7. Linearity Test.

Deviation from Linearity	Sig.
RPS	0.000
Diluted EPS	0.105
BVPS	0.108

Source: Stata.

4.3. Effect of Accounting Ratios on Stock Price

This study employed the robust regression test due to the data not fulfilling all of the classical tests, which are the heteroscedasticity test, normality test, and RPS failing the linearity test. The use of a robust regression method would validate large samples regardless of whether or not the errors within the samples have constant variance (Sloczyński and Wooldridge 2018), which satisfies the classical tests. Hence, the regression equation used within this study can be expressed as follows:

$$P_t = \alpha + \beta_1 ox_t + \beta_2 v_{1t} + \beta_3 b_t$$

where

α = Constant

P = Price

B = Book value per share

ox = Earnings per share

v = Revenue per share

β = Coefficient

Table 8 shows R^2 of model 0.4179, which means that independent variables (RPS, Diluted EPS, and BVPS) determined 41.79% of the dependent variable (sample stock price). Hence, 58.22% of the dependent variable is determined by factors outside the model.

Table 8. Model Summary.

	Beta (β)	Standard Deviation
Constant	17.0114	0.35
RPS	0.0293714	0.35
Diluted EPS	8.810849	2.59
BVPS	1.763064	0.59
N = 326		$R^2 = 0.4718$

Source: Stata.

Therefore, based on the robust regression model using Stata, the regression model can be expressed as follows:

$$P_t = 17.01714 + 8.810849\alpha_t + 0.0293714v_t + 1.763064b_t$$

The constant value of the regression is 17.01714, while the Diluted EPS, RPS, and BVPS have coefficients of 8.810849, 0.0293714, and 1.763064.

The f-test was used to determine the significance of all the independent variables to the dependent variables. In order to do this, the parameter that was used in this study is whether the Prob > F value is less than 0.05. If the Prob > F value is less than 0.05, this indicates that the independent variables are significant to the dependent variable. Based on the f-test results in Table 9, the Prob > F value is less than 0.05, which means that all of the independent variables (RPS, Diluted EPS, and BVPS) significantly affect the dependent variable (sample stock price).

Table 9. f-Test Regression Test Summary.

Number of Observations	Prob > F
326	0.0001

Source: Stata.

The t-test was also performed to determine whether there is a partial relationship on each variable between independent and dependent variables are significant. This was conducted by looking at the $P > |t|$ value on the regression result. If the $P > |t|$ is less than 0.05, the variable has a significant relationship with the dependent variable. Otherwise, the variable does not have any significant relationship with the dependent variable. Table 10 shows the results of each of the variables vary with RPS and do not have a significant correlation with the dependent variable (sample stock price), while Diluted EPS and BVPS have a significant correlation with the sample stock price.

Table 10. t-Test Regression Test Summary.

Independent Variables	P > t
RPS	0.934
Diluted EPS	0.001
BPVS	0.003
Constant	0.000

Source: Stata.

Based on the data analyses, it can be concluded that the results in this study are in line with the findings in previous studies that suggested a shift towards intangibles may make accounting figures less relevant to stock prices (Amir and Lev 1996; Lev and Zarowin 1999).

Other studies showed that accounting value relevance figures for intangible-intensive industries, such as high-technology services enterprises, are lower than non-intangible-intensive industries, such as IT service enterprises (Zhou et al. 2017). However, there are studies that showed the combined relevance of earnings and book value have not declined in the last forty years but rather increased. In addition, the decline in value relevance of bottom-line earnings has been caused by increased frequency of negative earnings, changes in average company size, intangible intensity across time, and an increasing relevance on non-recurring items (Collins et al. 1997).

In addition, studies have also revealed that based on samples in 2010, information regarding growth opportunities has shown a higher value relevance as bottom-line figures (EPS and BVPS) become less relevant and other accounting figures become more relevant (Barth et al. 2022). However, the findings in this study contradict previous studies that showed a low value relevance for the net earnings figures. One possible reason could be attributable to the global financial crisis in 2020 due to the COVID-19 pandemic and the risk of economic recession and hyperinflation at the end of 2021 and early 2022. This is supported by Gerrans et al. (2015) argued that macroeconomic context is able to influence investors' risk tolerance significantly. This modifies their asset allocations that lead to a massive shift of capital from riskier to less risky as investors' FRT (Financial Risk Tolerance) scores; during a global financial crisis that is significantly lower than prior to a global financial crisis.

4.4. Existence of Pricing Error

In this study, the weighted valuation multiples equation is expressed as follows:

$$P_{i,t}^{\text{equity}} = \alpha_{i,t} \times (\beta_{1,i,t} \times \lambda_{1,c,t}^{\text{equity}} \times x_{1,i,t} + \beta_{2,i,t} \times \lambda_{2,c,t}^{\text{equity}} \times x_{2,i,t} + \beta_{3,i,t} \times \lambda_{3,c,t}^{\text{equity}} \times x_{3,i,t})$$

where

$P_{i,t}^{\text{equity}}$: Company stock price

$\alpha_{i,t}$ = Adjustment factor

$\beta_{1,i,t}$ = Corresponding weight for EPS multiple

$\beta_{2,i,t}$ = Corresponding weight for BVPS multiple

$\beta_{3,i,t}$ = Corresponding weight for RPS multiple

$\lambda_{1,c,t}^{\text{equity}}$ = Price to Earnings multiple

$\lambda_{2,c,t}^{\text{equity}}$ = Price to Book Value multiple

$\lambda_{3,c,t}^{\text{equity}}$ = Price to Revenue Per Share multiple

$x_{1,i,t}$ = Company's EPS

$x_{2,i,t}$ = Company's BVPS

$x_{3,i,t}$ = Company's RPSs

The weight of each valuation multiple is assumed to be equal to 33% and is divided by each country's valuation multiples. Based on Table 11, it can be concluded that the valuation multiples used in this study can create an estimation for each company's equity value is the average valuation multiples in each country.

Table 11. Valuation Multiples Summary.

	PSR	PER	PBV
Global average	5.5	38.7	6.1
United States	6.6	29.5	7.7
Japan	3.8	76.6	4.7
China	4.3	58.9	3.8
United Kingdom	5.7	−2.1	5.6
France	1.8	6.5	1.7

Source: Yahoo Finance, Company Data, and Self-Analysis.

Hence, the equation can be expressed as:

$$\text{United States: } P^{\text{equity}}_{i,t} = 1 \times (33\% \times 29.5 \times x_{1,i,t} \times 33\% \times 7.7 \times x_{2,i,t} \times 33\% \times 6.6 \times x_{3,i,t})$$

$$\text{Japan: } P^{\text{equity}}_{i,t} = 1 \times (33\% \times 76.6 \times x_{1,i,t} \times 33\% \times 4.7 \times x_{2,i,t} \times 33\% \times 3.8 \times x_{3,i,t})$$

$$\text{China: } P^{\text{equity}}_{i,t} = 1 \times (33\% \times 58.9 \times x_{1,i,t} \times 33\% \times 4.3 \times x_{2,i,t} \times 33\% \times 3.8 \times x_{3,i,t})$$

$$\text{United Kingdom: } P^{\text{equity}}_{i,t} = 1 \times (33\% \times -2.1 \times x_{1,i,t} \times 33\% \times 5.6 \times x_{2,i,t} \times 33\% \times 5.7 \times x_{3,i,t})$$

$$\text{France: } P^{\text{equity}}_{i,t} = 1 \times (33\% \times 6.5 \times x_{1,i,t} \times 33\% \times 1.7 \times x_{2,i,t} \times 33\% \times 1.8 \times x_{3,i,t})$$

Through the equations, this study creates an estimation of each company’s intrinsic value and calculates the deviations between the stock price, intrinsic value, and the standard deviation of those deviations, expressed in Table 12.

Table 12. Valuation Multiples Result Summary.

	Global	United States	Japan	China	United Kingdom	France
Average deviation	45%	39%	67%	24%	57%	31%
Standard deviation	33%	30%	22%	21%	27%	38%

Source: Yahoo Finance, Company Data, and Self-Analysis.

As shown in Table 12, it can be seen that on average, companies’ stock prices in the United States, Japan, China, United Kingdom, and France typically have pricing errors at 39%, 67%, 24%, 57%, and 31% with standard deviations at 30%, 22%, 21%, 27%, and 38%, respectively. Hence, it can be seen that the biggest deviation from its estimated intrinsic value is in Japan and the United Kingdom, which may be due to the low required rate of return due to the low lending rate that companies within those countries have. Figure 1 depicts the historical lending rate.

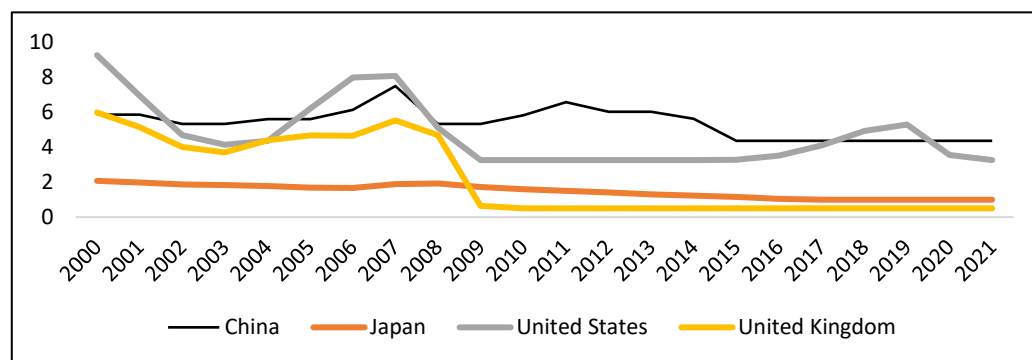


Figure 1. Historical Lending Interest Rate. Source: World Bank (2020).

In addition to the missing French data, according to trading economics, the latest French lending interest rate is at 1.5%. Hence, it can be concluded that based on the data above, Japan and the United Kingdom both have the lowest historical lending interest rates, which may lead investors to have a larger risk appetite, leading to overvaluation and pricing errors within the stock price. This is in line with the previous studies that argued a correlation between interest rates (Miah et al. 2016) or other monetary policy announcements (Pennings et al. 2011) and stock price movements.

4.5. Hypothesis Testing

This study employs a statistical hypothesis test to provide a response to the question of the strength of the association between independent and dependent variables. Consequently, this study uses an inferential statistic based on the sample to draw conclusions about the population. The *t*-test was run to assess if the partial association between independent and dependent variables on each variable is significant. This is accomplished

by examining the $P > |t|$ value on the regression output. If $P > |t|$ is less than 0.05, the link between the variable and the dependent variable is significant. Otherwise, there is no meaningful link between the variable and the dependent variable. Table 13 presents the results.

Table 13. *t*-Test Regression Summary.

Independent Variables	$P > t$
RPS	0.934
Diluted EPS	0.001
BVPS	0.003
Constant	0.000

The results of the *t*-test for each of the variables varied with RPS, and the constant does not have a significant connection with the dependent variable (stock price). However, Diluted EPS and BVPS do. The findings in this study are consistent with past studies that stated a shift toward intangibles may reduce the relevance of accounting statistics to stock prices (Amir and Lev 1996; Lev and Zarowin 1999). In addition, studies found that accounting value relevance statistics for intangible-intensive industries, such as high-tech service providers, are lower than for non-intangible-intensive industries, such as IT service providers (Zhou et al. 2017). The drop in the value relevance of bottom-line earnings was driven by a rise in the frequency of negative earnings, changes in average business size, an increase in the intangible intensity over time, and an increase in the importance of non-recurring items. (Collins et al. 1997). Therefore, this study supports H1, which states companies' EPS has a significant positive correlation with the companies' stock prices ($p = 0.001$), and H3, which states companies' BVPS has a significant positive correlation with the companies' stock prices ($p = 0.003$). On the other hand, this study could not support H2, which states companies' RPS has a significant positive correlation with the companies' stock prices ($p = 0.934$).

5. Conclusions

This study examines whether relevant accounting ratios influence the stock prices of high-technology services enterprises. Subsequently, this study determines the pricing error (if any) between the intrinsic value and the market value of the stock price based on the relevant accounting figures. Content analysis was performed on the annual reports of 326 high-technology services enterprises in 5 selected countries, and accounting information on Diluted EPS, RPS, and BVPS was extracted. This study shows that within the high-technology service industry, Diluted EPS and BVPS are significant to the stock price, while RPS is not. This study also shows that, on average, valuing a stock price within the high-tech service industry will lead to a pricing error of 45% with a standard deviation of 33% and will be the least inaccurate in companies in Japan and the United Kingdom.

This study is not without limitations. First, the regression analysis does not take into account other accounting ratios, such as cash per share as well as research and development expenses per share. Hence, the regression within this study only provides a rough estimation of the topic. Secondly, the valuation multiples used within this study may be inflated due to the variance of the samples, such as the price to RPS figures, as the regression analysis has shown the insignificance of the independent variable to the dependent variable. Hence, the pricing error that is observed within this study may not provide an accurate representation of the intrinsic value. Finally, the pricing errors observed within this study may be caused by other factors outside the low lending rate. Hence, further study needs to be conducted to observe this phenomenon.

The findings of this study provide a better understanding of stock valuation within the high-technology industry. That is, this study provides investors with a reliable framework or criteria for assessing technology companies. For example, in Indonesia, the phenomenon of Bukalapak IPO, one of the largest Indonesian IPOs to date, is to blame. Bukalapak has

been losing money year after year, although it was still worth IDR 21.9Tn on its IPO date; by 1Q22, it had lost over 70% of that value. As a result, standard metrics such as net profitability and book value may not be useful in assessing high-tech service companies such as GoTo and other Internet start-ups that are planning further IPO listings among Indonesian investors. Thus, the findings in this study can assist investors in better comprehending the important metrics within the high-tech industry by providing insight into the market's perspective on the valuations of high-tech businesses and the extent to which accounting data influence the movement of stock prices. Investors can gain a great deal of insight into the global prospects of technology companies, according to the findings of this study.

Author Contributions: Conceptualization, C.S.; methodology, J.C.S.; validation, C.S.; formal analysis, J.C.S.; investigation, J.C.S.; resources, C.S.; data curation, J.C.S.; writing—original draft preparation, C.S.; writing—review and editing, E.K.G.; visualization, E.K.G.; project administration, C.S.; supervision, C.S. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Informed Consent Statement: Not applicable.

Data Availability Statement: If you have further questions, please contact citra.sukmadilaga@unpad.ac.id or erlanekg@uitm.edu.my.

Acknowledgments: The authors would like to thank the editor and the two anonymous reviewers for their insightful and constructive comments on earlier versions of this paper.

Conflicts of Interest: The authors declare no conflict of interest.

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