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Comparative analysis of stock valuation models: The case of the Indonesian banking sector

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Abstract

This study evaluates the accuracy and explanatory power of priceearnings, price-to-book, and price-to-sales models. Most research focused on developed countries, while only limited studies compared equity valuation models in developing countries. Those studies show mixed and inconclusive results. Moreover, most studies on stock valuation models are primarily concerned with the model's accuracy but not their explanatory performance. Therefore, this study aims to determine the most suitable stock valuation models for accuracy and explanatory performance using data from medium and large banks in Indonesia. This is the first study to examine both stock valuation models' accuracy and explanatory performance in Indonesia. The data employed in this study are from 13 medium and large banks listed on the Indonesia Stock Exchange from 2012 to 2021. This study compares the models based on absolute prediction error and root mean square error to determine accuracy. It also evaluates the models using panel data regressions to determine the explanatory performance of each model. The findings reveal that the price-earnings model is superior to the accuracy and explanatory power of price-to-book and price-to-sales models. The price-earnings model has the lowest prediction errors, and it has the highest R-square compared to the other models. Based on the empirical findings of this study, the priceearnings model outperforms price-to-book and price-to-sales models in terms of accuracy and explanatory power. This suggests that the price-earnings model is the most suitable for conducting a stock valuation analysis of the banking sector in Indonesia.

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1. Introduction

When stock investors attempt to conduct a stock valuation, they must choose which models to use. This results in the confusing and burdensome task of choosing an appropriate model. As a result, investors tend to easily follow expert investors and make investment decisions without checking the accuracy of information (i.e., herding behaviour), often resulting in financial losses. Rahayu, Rohman, and Harto (2021) found that expert investors' social influence strongly affects investors' decisions in the Indonesian capital market. The Indonesia Stock Exchange (IDX) has experienced a significant increase in the number of investors in recent years. There is a strong need for a stock valuation model that accurately and effectively estimates intrinsic values. This model should be easy to use and simple to understand. Investors could use this stock valuation model to help estimate companies' intrinsic values and potentially find undervalued stocks.

Stock valuation models have been an important area of study since the 1990s. Past research has attempted to compare diverse stock valuation models in terms of their accuracy in predicting intrinsic values. However, results vary across markets and sectors. Most studies in developed countries, despite the extensive literature on

stock valuation approaches, have yielded inconclusive results. For example, Demirakos, Strong, and Walker (2010) found that the discounted cash flow (DCF) models outperform the price-earnings (P/E) model in forecasting target prices in the United Kingdom. In contrast, the book value multiple outperforms other multiples in the United States (Nissim, 2013).

In developing countries, the findings of several studies differ from those in developed countries and show mixed results. For instance, in India, Sehgal and Pandey (2010) and Sehgal and Pandey (2010b) showed that the price-earnings (P/E) ratio has better accuracy than the price-to-book (P/B), price-to-cash flow (P/CF), and price-to-sales (P/S) ratios. Considering both types of stock valuation models, income-oriented and market-oriented valuation models, Tiwari (2014) found that the residual income model has the best accuracy and explanatory performance compared to other stock valuation models in India. Only a handful of studies examine stock valuation models' accuracy and explanatory performance in emerging markets and particular sectors.

This study aims to determine the most suitable stock valuation model in terms of accuracy and explanatory performance in an important sector in Indonesia. There is a need for a study that looks at how accurate and useful market-oriented valuation models are in developing countries and certain important fields like banking. This is the research gap we attempt to fill in this study. Only market-oriented valuation models, specifically the P/E, P/B, and P/S models, are considered in this paper due to their widespread use in practice (Demirakos, Strong, & Walker, 2004).

The research questions in this study are as follows: First, which model is the most accurate for Indonesia as an emerging market and in the banking sector? Second, which model has the best explanatory power? The article employs absolute prediction error (APE) and root mean square (RMSE) to answer the first question and determine accuracy. A model with the lowest average error is considered the most accurate. For the second question, the paper looked at the R-squared of the price-earnings (P/E), price-to-book (P/B), and price-to-sales (P/S) models to see how well they explain prices on the stock market. A model with the highest R-squared indicates that it has the best explanatory power since forecasted intrinsic values can explain most of the variations in stock prices.

Samples used in this study are from the banking industry, specifically medium and large banks in Indonesia, some of which are state-owned large banks. These medium and large banks have long dominated Indonesia's banking industry, and many are stock market movers. Several banks, such as <code>Bank Rakyat Indonesia</code> (BBRI) and <code>Bank Mandiri</code> (BMRI), the two largest government-owned banks, and <code>Bank Central Asia</code> (BBCA), have high market capitalization and contribute significantly to the Indonesia Composite Index, or IHSG (<code>Indeks Harga Saham Gabungan</code>), an index for all stocks listed on the Indonesia Stock Exchange. The three major banks in our samples have a market weight of almost 22% of IHSG in 2023. They are on the list of top five stocks with high market capitalization, with BBCA being the company with the largest market capitalization in IHSG.

In the context of an emerging economy and banking sector, this study contributes to the literature by providing empirical evidence of stock valuation models' accuracy and explanatory performance. Academicians, investors, and analysts can use the most accurate and the best explanatory power stock valuation model in this study when conducting Indonesian bank valuations. Furthermore, this research will enhance our understanding of how different stock valuation models perform in developing countries and a specific sector like banking.

The following section reviews the literature on stock valuation models. The third section describes the methodology and data. The fourth section presents empirical findings and discusses them. The last section concludes the article.

2. Literature Review

Stock valuation models can be categorized into two main groups: absolute (income-oriented) and relative (market-oriented) models. Absolute valuation models, such as the dividend discount model (DDM), discounted cash flow model (DCF), and residual income model, determine a stock's intrinsic or "true value" based on projected future cash flows, dividends, and earnings growth. These models define an asset's intrinsic value as the present value of its expected future cash flows. Several studies have compared the accuracy and performance of absolute valuation models, including research by Bernard (1995); Francis, Olsson, and Oswald (2000); Frankel and Lee (1998); and Penman and Sougiannis (1998). For example, according to Francis et al. (2000) intrinsic values calculated using the discounted abnormal earnings model (DAE) outperformed both the discounted dividend model (DDM) and free cash flow (FCF) value estimates in terms of accuracy and explanatory power.

On the other hand, relative valuation models employ market-oriented metrics such as price-to-earnings (P/E), price-to-book (P/B), and price-to-sales (P/S) ratios. These models are popular among practitioners due to their simplicity and ease of understanding. They require calculating multiples for comparison with similar companies. Kim and Ritter (1999) examined various price multiples for valuing initial public offerings (IPOs) and found that their predictive ability was initially modest without adjustments. This was due to significant variations in these multiples among new firms within the same industry. Interestingly, their study revealed that P/E ratios using forecasted earnings performed substantially better than those based on historical earnings.

The performance of these stock valuation models varies across different markets and sectors. In developed countries, Liu, Nissim, and Thomas (2007) compared value estimates based on cash flow multiples and earnings multiples. Contrary to the intuitive claims that cash flow is better than earnings in equity valuation, they found that earnings forecast multiple performed better than cash flow forecast multiple in all five countries examined and in most industries. Several studies in emerging countries show mixed results. Sehgal and Pandey (2010) and Sehgal and Pandey (2010b) showed that the P/E ratio is the best ratio to forecast stock prices in the Indian

stock market. However, Gill (2003) found that the price-earnings-growth model is more favourable than the P/E ratio in the Indian context. Gupta (2018) showed that the accuracy of different market-oriented models depends on the sector. He found that the P/S ratio is the most accurate for the automobile sector, the enterprise multiple, enterprise value/earnings before interest, taxes, depreciation, and amortization (EV/EBITDA) for the steel sector, and the P/B for the banking sector. In Indonesia, several studies in different sectors also show mixed results. For example, Pengestika and Christianti (2021) showed that the P/E model is not the most accurate in predicting intrinsic values compared to the dividend discount model (DDM), DCF, and free cash flow to equity (FCFE). In contrast, Sutjipto and Setiawan (2020) found that the DDM has better accuracy than the P/E ratio in the Indonesia Stock Exchange.

Although extensive research exists on stock valuation, research gaps remain. Few studies examine stock valuation models' accuracy and explanatory performance in emerging markets and specific sectors. How these models perform in the particular economic and regulatory environments of emerging markets like Indonesia remains poorly understood. The banking sector in these markets is highly regulated and sensitive to changes in global and local macroeconomic factors. Investors need a reliable and effective tool to conduct stock valuation in this banking sector within a high-risk emerging market.

This study attempts to fill these gaps by comparing the accuracy and explanatory performance of P/E, P/B, and P/S models in the Indonesian banking sector. Examining the efficiency of different stock valuation models within a specific market and vital sector should contribute to adding knowledge for academic researchers and practitioners. This study improves our understanding of how well different valuation models work across markets and sectors. It is expected to bridge a gap in the existing literature on emerging market stock valuation.

3. Methodology and Data

3.1. Methodology

We evaluate several market-oriented valuation models: the P/E, P/B, and P/S. To apply these models, we first calculate the intrinsic values of sample banks, which require estimating forecasted input parameters. Then, we seek the most accurate model by examining the three models' absolute prediction error (APE) and root mean square error (RMSE). A model with the lowest value of APE and RMSE is considered the most accurate.

Furthermore, we estimate the explanatory performance of market value on value estimates (Tiwari, 2014). We compare the R-squared of the models to determine how well they explain stock market price changes. A higher R-squared means the model can explain more of the variations in stock prices. In other words, R-squared measures the explanatory power of the stock valuation model. Details about the models and econometric approaches are discussed below.

$$PE_{it} = \frac{Price_{it}}{EPS_{it}}$$

$$IV_{it} = FPE_{it} * FEPS_{it}$$
(2)

$$IV_{it} = FPE_{it} * FEPS_{it} \tag{2}$$

3.1.1. Price to Earnings Per Share Ratio (P/E)

Where PE_{it} is the price-earnings ratio of bank i at period t, $Price_{it}$ is the stock market price of bank i at period t, EPS_{it} is earnings per share of bank i at period t, IV_{it} is the intrinsic value of bank i at period t, FPE_{it} is a forecasted price to earnings per share of bank i at period t, FEPSit is forecasted earnings per share of bank i at period t.

$$PB_{it} = \frac{Price_{it}}{BV_{it}}$$

$$IV_{it} = FPB_{it} * FBV_{it}$$

$$(3)$$

$$IV_{it} = FPB_{it} * FBV_{it} \tag{4}$$

3.1.2. Price to Book Value Ratio (P/B)

Where PB_{it} is a price-to-book ratio of bank i at period t, $Price_{it}$ is the stock market price of bank i at period t, BV_{it} is the book value per share of bank i at period t, IV_{it} is an intrinsic value of bank i at period t, FPB_{it} is a forecasted price-to-book per share of bank i at period t, and FBVit is a forecasted book value per share of bank i at period t.

$$PS_{it} = \frac{Price_{it}}{S_{it}}$$

$$IV_{it} = FPS_{it} * FS_{it}$$
(5)

$$IV_{it} = FPS_{it} * FS_{it}$$
 (6)

3.1.3. Price to Sales Ratio (P/S)

Where PS_{it} is the price-to-sales ratio of bank i at period t, $Price_{it}$ is the stock market price of bank i at period t, S_{it} is net sales of bank i at period t, IV_{it} is an intrinsic value of bank i at period t, FPS_{it} is a forecasted price-to-sales of bank i at period t, FS_{it} is a forecasted sales of bank i at period t.

In determining intrinsic values, we need to calculate forecasted values in Equations 2, 4, and 6. We use panel regression to estimate a feasible GLS accounting for heteroskedasticity in the model. The following are the specifications:

$$PE_{i,t} = \beta_0 + \beta_1 PE_{i,t-1} + \varepsilon_{i,t} \tag{7}$$

3.1.4. P/E Ratio and Earnings Forecast for the P/E Model

Where PE is price to earnings per share, t-1 is the lagged term, β_0 is constant, β_1 is coefficient, $\varepsilon_{l,t}$ is error.

$$EPS_{i,t} = \beta_0 + \beta_1 EPS_{i,t-1} + \varepsilon_{i,t}$$
 (8)

 $EPS_{i,t} = \beta_0 + \beta_1 EPS_{i,t-1} + \varepsilon_{i,t} \tag{8}$ Where EPS is earnings per share, t-1 is lagged term, β_0 is constant, β_1 is coefficient, $\varepsilon_{i,t}$ is error.

$$PB_{i,t} = \beta_0 + \beta_1 PB_{i,t-1} + \varepsilon_{i,t} \tag{9}$$

3.1.5. P/B Ratio and Book Value Forecast

Where PB is a price-to-book value, t-1 is a lagged term, β_0 is constant, β_1 is coefficient, $\varepsilon_{i,t}$ is error.

$$BV_{i,t} = BV_{t-1} + FEPS_{i,t} - FDPS_{i,t}$$
 (10)

Where BV is book value, FEPS is forecasted earnings per share, FDPS is forecasted dividend per share $(FDPS_{i,t} = FEPS_{i,t} * DPR)$, DPR is the dividend payout ratio.

$$PS_{i,t} = \beta_0 + \beta_1 PS_{i,t-1} + \varepsilon_{i,t}$$
(11)

3.1.6. P/S Ratio and Sales Forecast

Where PS is price to book ratio, t-1 is lagged term, β_0 is constant, β_1 is coefficient, $\varepsilon_{i,t}$ is error.

$$S_{i,t} = \beta_0 + \beta_1 S_{i,t-1} + \varepsilon_{i,t} \tag{12}$$

 $S_{i,t} = \beta_0 + \beta_1 S_{i,t-1} + \varepsilon_{i,t} \tag{12}$ Where S is sales, t-1 is lagged term, β_0 is constant, β_1 is coefficient, $\varepsilon_{i,t}$ is error.

3.1.7. Absolute Prediction Error

To measure the accuracy of the models, we employ the absolute prediction error (APE) approach, calculated as the absolute difference between market value and intrinsic value divided by market value. Intrinsic values are calculated using Equations 2, 4, and 6, while market prices are from the Yahoo Finance website.

Absolute prediction error =
$$|MV - IV|/MV$$
 (13)

Where MV is the market value and IV is the intrinsic value of the P/E, P/B, and P/S models.

3.1.8. Root Mean Squared Error

Following Sengal and Pandey (2010) and Sengal and Pandey (2010b) we compute the root mean squared error (RMSE) for the three models. RMSE values are used to compare forecasts across different models. A model with the lowest RMSE has better forecasting ability.

Root Mean Squared Error =
$$\sqrt{\frac{\sum_{t=t+1}^{T+h}(y_t - \hat{y}_t)^2}{h}}$$
 (14)

Where y_t is the observed value, \hat{y}_t is forecasted value, and h is the number of observations. Many previous research studies employed the RMSE to evaluate model performance. Chai and Draxler (2014) argue that the RMSE is more suitable to measure model performance than the mean absolute error.

3.1.9. Explanatory Power

Further, we measure the explanatory power of the models using a panel data regression accounting for heteroskedasticity and autocorrelation. We compare the R-squared of three models to determine which model has the highest R-squared or, in other words, the highest explanatory power (Tiwari, 2014).

$$MV_{i,t} = \beta_0 + \beta_1 IV_{i,t} + \varepsilon_{i,t}$$
 (15)

Where $MV_{i,t}$ is the market value of bank i at period t, $IV_{i,t}$ is the intrinsic value of bank i at period t, β_0 is constant, β_1 is coefficient, $\varepsilon_{i,t}$ is error.

3.2. Data

This study obtains secondary data such as book value per share, EPS, and sales from the bank's annual report. Stock market prices are obtained from the Yahoo Finance website. The data period is ten years, from 2012 to 2021. Appendix 1 provides information on variables and their sources. Table 1 shows the list of banks in this study. Samples are selected using the following criteria. First, Indonesia's stock market (Bursa Efek Indonesia/BEI) must list banks from 2012 to 2021. Second, banks are in categories 3 and 4 based on the regulation from Otoritas Jasa Keuangan or Financial Service Authority. Banks in category 3 (KBMI 3) have core capital ranging from Rp 14 trillion to 70 trillion, suggesting these are medium banks. The category 4 banks (KBMI 4) have a core capital of more than Rp 70 trillion, indicating these are large banks. Based on these criteria, we selected thirteen banks out of 41 banks. As shown in Table 1, the four largest banks in Indonesia were in category 4, while the rest were in category 3. BBCA, a non-state-owned bank, has the largest market capitalization in the Indonesian stock market exchange. The Indonesian government is the majority shareholder of BBRI, BMRI, and BBNI.

Table 1. Selected banks.

No.	Stock code	Company name	Category
1	BBRI	Bank Rakyat Indonesia (Persero) Tbk.	KBMI 4
2	BBCA	Bank Central Asia Tbk.	KBMI 4
3	BMRI	Bank Mandiri (Persero) Tbk.	KBMI 4
4	BBNI	Bank Negara Indonesia (Persero) Tbk.	KBMI 4
5	PNBN	Bank Pan Indonesia Tbk.	KBMI 3
6	BDMN	Bank Danamon Indonesia Tbk.	KBMI 3
7	BNGA	Bank CIMB Niaga Tbk.	KBMI 3
8	BNLI	Bank Permata Tbk.	KBMI 3
9	BTPN	Bank BTPN Tbk.	КВМІ з
10	NISP	Bank OCBC NISP Tbk.	КВМІ з
11	BNII	Bank Maybank Indonesia Tbk.	КВМІ з
12	BBTN	Bank Tabungan Negara (Persero) Tbk.	КВМІ з
13	MEGA	Bank Mega Tbk.	КВМІ з

Source: Financial services authority (OJK).

4. Result and Discussion

4.1. Descriptive Statistics

Table 2 presents descriptive statistics for variables used in stock valuation models based on a dataset with 130 observations. The descriptive statistics are mean, median, standard deviation, minimum, and maximum. As shown in Table 2, investing in medium and large banks in Indonesia proves to be highly profitable. Investors are likely to obtain significant capital gains and high dividends. The average earnings per share (EPS) for all 13 banks from 2012 to 2021 is 291. This EPS is considerably higher than the industry average of 32.89, suggesting these banks outperform the industry.

Table 2. Descriptive statistics of research variables.

Variable name	Mean	Median	Std. deviation	Minimum	Maximum
EPS	291	176	289	-368	1159
P/E	14	11	14	-1	116
Stock price	2.881	2.203	2.356	170	9.900
BVS	2.671	1.882	2.824	159	27.448
DPR	0.201	0.199	0.201	0.000	0.732
ROE	0.112	0.100	0.070	-0.336	0.288
P/B	1.23	0.97	0.75	0.11	4.44
P/S	2.31	1.67	1.88	0.35	13.71
Dividend/Share	74.06	31.65	100.84	0.00	455.00
Log sales	30.67	30.51	0.87	28.45	32.60

The standard deviation of EPS is 289, meaning that the profitability of these large banks has low variability. Our samples were traded 14 times higher than their earnings per share. This average, however, remains below the Indonesia Composite Index's P/E in 2021, around 22, suggesting some of these medium and large banks are likely to be undervalued. Furthermore, the average Dividend Per Share (DPR) is 20%, and the maximum DPR is 73%. The dividend amount per share varies substantially, as indicated by a significant standard deviation. The average dividend per share is Rp 74.06. Large state-owned banks usually pay high dividends, one of the Indonesian government's non-tax incomes.

4.2. Absolute Prediction Error Results

Table 3 shows the absolute prediction error of the three models. As indicated in Table 3, the P/E model has the lowest average of 0.717 and a median absolute prediction error of 0.408 compared to other models. In contrast, the P/S model indicates the highest mean absolute prediction error. The P/E model has the best accuracy in predicting intrinsic values because it has the lowest error prediction of the differences between market and intrinsic values. Additionally, the P/E model's absolute prediction error has the most dispersion compared to the PB and P/S models (0.964, 0.086, and 0.053, respectively).

Table 3. Absolute prediction error of valuation models.

APE statistics	P/E	P/B	P/S	
Mean	0.717	0.899	0.953	
Median	0.408	0.913	0.977	
Std. dev.	0.964	0.086	0.053	
Interquartile	0.600	0.088	0.042	

4.3. Root Mean Square Error Results

Furthermore, we also look at the RMSE of these three equity valuation models to better understand the accuracy of the results from the models considered. As shown in Table 4, the P/E model exhibits the lowest RMSE compared to the other models, with the P/S model showing the largest RMSE. Based on the absolute prediction error and RMSE, we conclude that the P/E model demonstrates superior accuracy while the P/S model exhibits the least accurate performance. This result is similar to that of the absolute prediction error.

Table 4. RMSE results.

Model name	RMSE
P/E	1.756
P/B	1.946
P/S	2.293

Our results are consistent with those of Demirakos et al. (2010); Liu et al. (2007); Nissim (2013) and Tiwari (2014). They all found that the P/E model is superior to their models in accuracy. However, our findings do not align with those of Bünyamin (2012); Pengestika and Christianti (2021) and Sutjipto and Setiawan (2020) who found that the P/E model is less accurate than the DDM.

4.4. Explanatory Performance

Table 5 shows the results of univariate regression of market value on value estimates. As indicated in Table 5, all models' intrinsic value coefficients are highly significant (p-values are less than 1%). However, only the P/E and P/B models are significant based on the F-test. The P/E model has the best explanatory power compared to the other two models. Forty-five percent of the variability in market price is explained by the intrinsic value of the P/E model compared to 32 percent and 6 percent for the P/B and P/S models. Our results are in line with those of Sehgal and Pandey (2010) and Firth, Li, and Wang (2008). This paper's findings are also consistent with those of Sayed (2017). However, they are not in line with the results of Amiri, Ravanpaknodezh, and Jelodari (2016).

Table 5. Univariate regression on market value.

Regression results	IV_P/E	IV_P/B	IV_P/S
Coefficient	0.415***	3.210***	54.008***
R-square	0.4523	0.3274	0.0665
Model significance	0.0000	0.0006	0.1257

Note: *** p<0.01

IV_P/E=Intrinsic values of P/E model; IV_P/B=Intrinsic values of P/B model; IV_P/S=Intrinsic values of P/S model.

The findings of this study show that the P/E model is better than the P/B and P/S models in terms of accuracy and explanatory power. The P/E model has the lowest mean errors in predicting intrinsic values, suggesting it is the most accurate among all other models. Additionally, the P/E model has the highest R-squared compared to the other two, indicating that its predicted intrinsic values explain a larger proportion of the variability of stock prices. Based on these results, the P/E model is the most suitable valuation approach for medium and large banks in the Indonesian market. This makes it a valuable tool for investors, analysts, and financial professionals.

5. Conclusion and Suggestion

This study examines the accuracy and explanatory performance of three widely used market-oriented models using samples from the Indonesian banking sector. It fills a significant research gap in the literature by highlighting how those three models perform in an emerging market and crucial economic sector. This paper's findings show that the P/E model outperforms the P/B and P/S models in these areas. The P/E model has the lowest average absolute prediction error and root mean square error compared to the other models. These results indicate the superior accuracy of the P/E model in this specific context. Furthermore, the P/E model has the highest R-squared. Intrinsic values estimated by the P/E model can explain almost forty-five percent of the variation in market prices. These suggest that the P/E model has the best explanatory power among the three models.

This paper adds to what's already been written by showing how well the P/E, P/B, and P/S models of the Indonesian banking sector are at predicting the future and explaining things. The results support existing studies and contribute to a discussion about which income-oriented models work well in a given emerging market sector. These findings have several implications for investors, analysts, and finance professionals. The P/E model helps investors identify undervalued Indonesian bank stocks. Financial analysts can use either the P/E model or combine it with another model to make better bank stock recommendations. Portfolio managers can use the findings in this study for portfolio allocation and investment strategies. Furthermore, policymakers could use the P/E model to evaluate banks and design related policies.

While this study provides some insight, it has several drawbacks. This result is specific to medium and large banks in Indonesia. It cannot be generalized to other sectors or other countries. This study only considers three

market-oriented models. In addition, this study does not account for other potential stock valuation variables such as management, macroeconomic factors, and competition within the banking sector.

This study proposes a number of areas for further research to extend its scope. Future studies might expand beyond banks to other industries within Indonesia to test whether the P/E model is the most accurate and has superior explanatory performance. Most research could compare the market-oriented and income-oriented valuation models that are used a lot to find out which one works best for valuing stocks in emerging markets. As new methods become more popular, more research could combine older valuation models with newer ones, like those that use big data analysis or machine learning, which could lead to new ways of valuing things.

References

- Amiri, A., Ravanpaknodezh, H., & Jelodari, A. (2016). Comparison of stock valuation models with their intrinsic value in Tehran Stock exchange. *Marketing and Branding Research*, 3, 24-40. https://doi.org/10.33844/mbr.2016.60280
- Bernard, V. L. (1995). The Feltham-Ohlson framework: implications for empiricists. *Contemporary Accounting Research*, 11(2), 733. https://doi.org/10.1111/j.1911-3846.1995.tb00463.x
- Bünyamin, E. (2012). The accuracy of price-earnings ratio and discounted cash flow methods in predicting the offer price of IPO stocks. *International Research Journal of Finance and Economics*, 97, 27-31. https://www.researchgate.net/profile/Bunyamin-Er/publication/321059102_The_Accuracy_Of_Price-Earnings_Ratio_And_Discounted_Cash_Flow_Methods_In_Predicting_The_Offer_Price_Of_Ipo_Stocks/links /5a0b1a8baca2721a23f9a682/The-Accuracy-Of-Price-Earnings-Ratio-A
- Chai, T., & Draxler, R. R. (2014). Root mean square error (RMSE) or mean absolute error (MAE)?—Arguments against avoiding RMSE in the literature. Geoscientific Model Development, 7(3), 1247-1250. https://doi.org/10.5194/gmd-7-1247-2014
- Demirakos, E. G., Strong, N. C., & Walker, M. (2004). What valuation models do analysts use? *Accounting Horizons, 18*(4), 221–240. https://doi.org/10.2308/acch.2004.18.4.221
- Demirakos, E. G., Strong, N. C., & Walker, M. (2010). Does valuation model choice affect target price accuracy? *European Accounting Review*, 19(1), 35-72. https://doi.org/10.1080/09638180902990630
- Firth, M., Li, Y., & Wang, S. S. (2008). Valuing IPOs using price-earnings multiples disclosed by IPO firms in an emerging capital market. Review of Pacific Basin Financial Markets and Policies, 11(03), 429-463. https://doi.org/10.1142/s0219091508001428
- Francis, J., Olsson, P., & Oswald, D. R. (2000). Comparing the accuracy and explainability of dividend, free cash flow, and abnormal earnings equity value estimates. *Journal of Accounting Research*, 38(1), 45-70. https://doi.org/10.2307/2672922
- Frankel, R., & Lee, C. M. (1998). Accounting valuation, market expectation, and cross-sectional stock returns. *Journal of Accounting and Economics*, 25(3), 283-319. https://doi.org/10.1016/s0165-4101(98)00026-3
- Gill, S. (2003). Price-earnings ratio revisited. Finance India, 17(3), 937–951.
- Gupta, V. (2018). Predicting accuracy of valuation multiples using value drivers: Evidence from Indian listed firms. Theoretical Economics Letters, 8(5), 755-772. https://doi.org/10.4236/tel.2018.85052
- Kim, M., & Ritter, J. R. (1999). Valuing ipos. Journal of Financial Economics, 53(3), 409-437.
- Liu, J., Nissim, D., & Thomas, J. (2007). Is cash flow king in valuations? Financial Analysts Journal, 63(2), 56-68. https://doi.org/10.2469/faj.v63.n2.4522
- Nissim, D. (2013). Relative valuation of US insurance companies. Review of Accounting Studies, 18, 324-359. https://doi.org/10.1007/s11142-012-9213-8
- Pengestika, T. N., & Christianti, A. (2021). Stock valuation and investment decision making: comparison of absolute methods and relative methods. *Jurnal Bisnis Dan Manajemen*, 8(2), 291-299. https://doi.org/10.26905/jbm.v8i2.6127
- Penman, S. H., & Sougiannis, T. (1998). A comparison of dividend, cash flow, and earnings approaches to equity valuation. Contemporary Accounting Research, 15(3), 343–383. https://doi.org/10.1111/j.1911-3846.1998.tb00564.x
- Rahayu, S., Rohman, A., & Harto, P. (2021). Herding behavior model in investment decision on emerging markets: Experimental in Indonesia. *Journal of Asian Finance, Economics and Business, 8*(1), 053-059.
- Sayed, S. A. (2017). How much does valuation model choice matter? Target price accuracy of PE and DCF model in Asian emerging markets. *Journal of Accounting in Emerging Economies*, 7(1), 90-107. https://doi.org/10.1108/jaee-10-2014-0055
- Sehgal, S., & Pandey, A. (2010). Equity valuation using price multiples: A comparative study for BRICKS. *Asian Journal of Finance & Accounting*, 2(1), 68. https://doi.org/10.5296/ajfa.v2i1.283
 Sehgal, S., & Pandey, A. (2010b). Predicting accuracy of valuation multiples using value drivers: Evidence from indian listed
- Sehgal, S., & Pandey, A. (2010b). Predicting accuracy of valuation multiples using value drivers: Evidence from indian listed firms. Asian Academy of Management Journal of Accounting and Finance, 6(1), 89-108.
- Sutjipto, E., & Setiawan, W. (2020). Accuracy of dividend discount model and p/e ratio valuation in Indonesia stock exchange. Paper presented at the Proceedings of the the 3rd International Conference on Education & Social Science Research (ICESRE).
- Tiwari, R. (2014). Review of accuracy of equity valuation models: Firm level evidence from Indian service sector. Paper presented at the Proceedings of International Conference on Business Paradigms in Emerging Markets," December.

Appendix 1. Description of variables.

Variable name	Full name	Variable description	Source
EPS	Earnings per share	Earnings divided by outstanding share of common stock.	Annual report
P/E	Price earning ratio	Current stock price per share divided per- share earnings (EPS).	Yahoo finance & annual report
Stock price	Closing price of a stock	The price at which the stock traded during the final moments of the trading session on the last trading day of the year.	Yahoo finance
BVS	Book value per share	Company's assets minus its liabilities per share of common stock.	Annual report
DPR	Dividend payout ratio	The proportion of net income a company pays out as dividends to shareholders.	Annual report
ROE	Return on equity	A measure of a company's profitability.	Annual report
P/B	Price to book value	Stock price per share divided by book value per share.	Yahoo finance & annual report
P/S	Price to sales ratio	Stock price per share divided by revenue.	Yahoo finance & annual report
Dividend/Share	Dividend per share	Assets minus liabilities divided by the number of shares of common stock.	Bloomberg
Sales	Total sales	The total sales of a company's goods or services.	Annual report