
Emerging market stock valuation: new evidence from Peru

Pablo José Arana Barbier* and
Kurt Johnny Burneo Farfán

CENTRUM Católica Graduate Business School (CCGBS),
Pontificia Universidad Católica del Perú (PUCP),
Jr. Daniel Alomía Robles 125, Urb. Los Álamos de Monterrico,
Santiago de Surco, 15023, Lima, Peru

Email: pablo.arana@pucp.pe

Email: kburneo@pucp.edu.pe

*Corresponding author

Abstract: There is still a debate regarding which valuation multiples can estimate the price of a stock. Nevertheless, recent research has not considered previous relevant findings and authors are still in an ‘exploratory’ phase that targets multiples randomly, without analysing intentionally developed and emerging markets separately. The purpose of the investigation is to determine how strongly do the valuation multiples preferred by the literature all around the world explain the price of the stocks in emerging countries such as Peru, through panel data multiple linear regression models. Specific delimitations based on the literature are considered. Results show that: a) the model composed by valuation multiples from different emerging markets studies correlates strongly with the stock price throughout 20 years of analysis; b) the model can be reduced to a very short but statistically solvent expression; c) the commodity-related business is introduced as a novel explanatory variable.

Keywords: cost efficiency; EBITDA per share; earnings per share; emerging markets; panel data; multiple linear regression; stock valuation; commodity-related business; valuation models; valuation multiples; Peru.

Reference to this paper should be made as follows: Arana Barbier, P.J. and Burneo Farfán, K.J. (2021) ‘Emerging market stock valuation: new evidence from Peru’, *Int. J. Economic Policy in Emerging Economies*, Vol. 14, No. 1, pp.39–65.

Biographical notes: Pablo José Arana Barbier is a Doctoral candidate and MBA from the Pontificia Universidad Católica del Perú. He obtained his Master’s in Leadership from the EADA Business School, Barcelona. He also completed his Degree in Administration and International Business from the Universidad Peruana de Ciencias Aplicadas. He specialist in topics such as financial management, cost optimisation, corporate finance, project evaluation, logistics, and has ten years of teaching experience. He has one peer reviewed journal accepted manuscript currently in press. He currently works as a Professor and researcher at the CENTRUM PUCP Business School, Lima, Peru.

Kurt Johnny Burneo Farfán holds a Doctor in Administration and Management from the Universidad Ramón Llull-Esade, Spain. He obtained his Master’s in Economics from the Pontificia Universidad Católica del Perú. He is an Ex Scholar from the Escola de Pós-graduação Economia from Universidad de

Sao Paulo, Brasil. He also obtained his Degree in Economics from the Universidad Nacional Mayor de San Marcos, Peru. He specialist in finance and economics, and has more than 24 years of teaching experience. He has published 12 books and is author/co-author of ten articles published in peer reviewed and worldwide prestigious journals. He currently works as a Professor and researcher at the CENTRUM PUCP Business School, Lima, Peru.

1 Introduction

Stocks' prices vary every day. This happens mainly because the market's expectations on the future benefits that the company will generate also do. Other factors, particularly in secondary markets, can also affect market prices and liquidity. For example, when markets are optimistic, stocks tend to be more liquid (Liu, 2015). News that are interpreted as optimistic usually will cause prices to increase, while negative news will generate the opposite effect (Koubouros et al., 2009; Xie, 2011). This tends to be true, but the market also tends to general conservative agreements when profits are expected to be low, and to general disagreements when they are expected to be high (Giannini et al., 2019). Nevertheless, the problem is not their current behaviour, but to try to predict it in the long-term.

A company is worth for its capability to generate future cash flow (CF), and if their returns exceed the market's opportunity cost (Kaplan and Ruback, 1995), then the price of the stock should rise (Lie and Lie, 2002). However, this is not always easy to estimate (Damodaran, 2013; Plenborg and Pimentel, 2016) since financial information is not always available (Festel et al., 2013), and if it is, it should be comparable (Choi et al., 2019). A more feasible way to estimate the price of a stock is to identify which valuation multiples correlate better with it (Alford, 1992; Altman, 1968; Trejo et al., 2015). The main inconvenient is that authors among time have not reached an agreement regarding which multiples are more suitable for that purpose. Actually, they offer different and even contradictory evidence according to the specific characteristics of the companies studied and the circumstances that surround them (Bagna and Ramusino, 2017; Calomiris and Nissim, 2014; Damodaran, 2013; Krupasindhu, 2017). Particularly for emerging economies, "there is no clear single 'best practice' for the valuation of assets and securities in emerging countries" [Bruner et al., (2002), p.311].

Additionally, there are many findings that have been considered separately by the literature, but not all of them in sum, to try to reach patterns. There are:

- a geographic
- b industry
- c size implications that may affect valuation (Cheng and McNamara, 2000; Damodaran, 2012; Omran, 2003; Welc, 2012), plus statistical tests that were not conducted in many cases to avoid problems such as:
 - 1 multicollinearity
 - 2 homoscedasticity
 - 3 stability of parameters (Cea, 2002; Chow, 1960; Hair et al., 2010; Véliz, 2017).

The only thing that remains clear is that financial information is very important, but must be used and interpreted appropriately (Lee and Junkus, 1983).

Because of all the gaps in the literature that have not yet been covered and the fact that there are findings available which have not been combined yet to analyse potential patterns, plus the fact that there is not a formal and agreed upon methodology to estimate the price of the stock in emerging markets, it becomes important to define which valuation multiples, in a long-term analysis in an emerging country [specifically in the Peruvian Stock Exchange (*Bolsa de Valores de Lima*, BVL)] explain better the stock prices. The study is significant for six main reasons. First, it did not target to just explore which valuation multiples explain better the price of the stock, but it built over and strengthened what has already been concluded by other researchers through a rigorous and profound literature review. Second, it considered the geographic, size and industry delimitations proposed by the literature. Third, there is not yet a formal agreement for a valuation methodology through multiples, particularly for an emerging country, and the study proposes a strong and reduced model. Fourth, the research will promote further debate and deeper analysis on valuation multiples as estimators of stock prices. Fifth, its longitudinal design through time series offers the opportunity to understand not only the models' explanation level, but their evolution among time. Finally, the study considered four dummy variables, which will be further explained, and one of them represents a novel contribution to the stock valuation theory.

2 Literature review

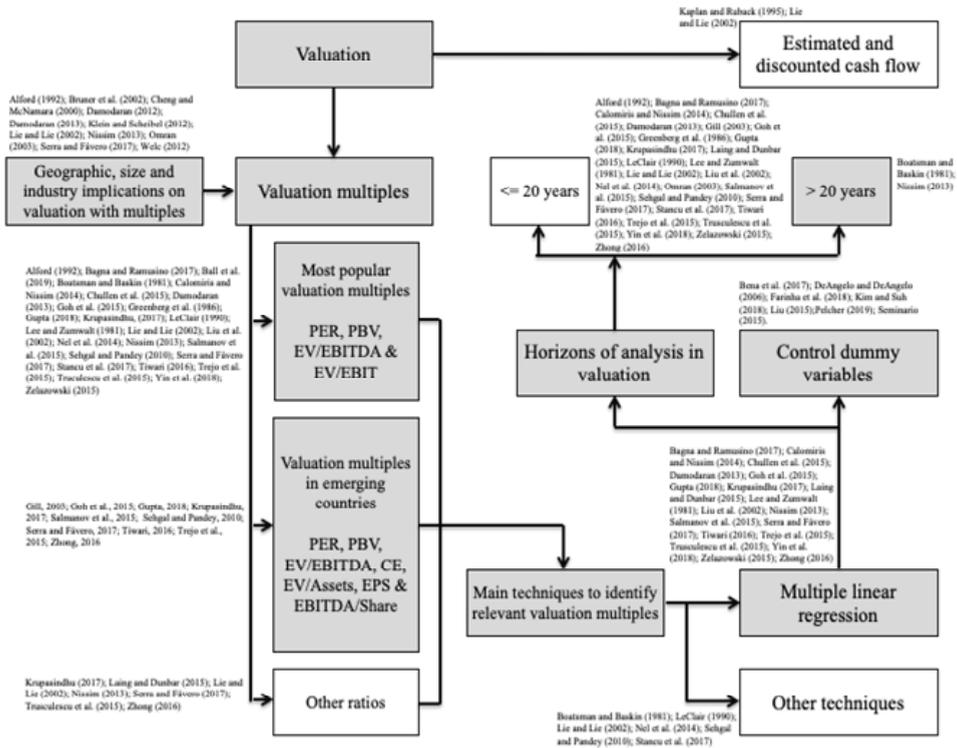
The information shown in the literature review obeys to research published mainly in academic journals regarding the main variables that were studied: valuation multiples. In order to identify the state-of-the-art, it was necessary to review several databases such as EBSCO Discovery Services (EDS), EBSCO Research Database (ERD), Emerald, JStor, Proquest, Sage Publishing, Science Direct, Scopus, Web of Science and Wiley Online Library, available through CENTRUM PUCP Business School. Figure 1 shows the literature review map.

2.1 Valuation

There are several financial methodologies that lead to determining the price of a stock (Damodaran, 2006; Parra, 2013). The most accurate one consists on the present value of all the estimated benefits that the stockholders will perceive in the future (Lie and Lie, 2002). Besides, if markets are efficient, the stock market price should fluctuate around its intrinsic value (Fama, 1965; Liu, 2015; Van Horne and Wachowicz, 2010), considering a stable tax policy which influences stock returns' volatility (Kuncoro, 2017). Nevertheless, estimating the price of a stock can turn out to be complicated (Damodaran, 2013; Plenborg and Pimentel, 2016), plus the information must be comparable (Choi et al., 2019). Even though that is how valuation multiples emerged as a very practical valuation alternative (Damodaran, 2013), Greenberg et al. (1986) compared earnings against CF and determined that earnings are better estimators of CF than the CF itself, although Sulistiawan and Rudiawarni (2019) clarified that earnings should be

informative, and if they lose that characteristic, then valuation should be conducted through other means.

Figure 1 Literature review map



Source: Author compiled

Even though Imam et al. (2013) found that the two main techniques used by Dow Jones Euro Stoxx 50 Index analysts were the DCF and multiples based on earnings, Festel et al. (2013) explained that the CF is used when there is detailed information available (Fernández, 2002). In spite of that, Damodaran (2005) found through 550 reports from investment banks that multiples were used ten times more as a valuation method over the DCF, even when having information available. Among other attempts to understand stock valuation:

- a Brown and Cliff (2004) stated that, even though CF is relevant, investor sentiment influences short-term stock returns
- b Yermack (1996) proposed that companies with smaller boards of directors reached higher market value
- c other authors tried to relate valuation through DCF with residual income (Plenborg, 2002) and net financial expenses (Beisland, 2014), and did not reach any kind of relation at all.

What seems to be the overall conclusion is that the CF is considered the most accurate valuation method (Lie and Lie, 2002) and valuation multiples the most used and practical method to date (Damodaran, 2005).

2.2 Valuation multiples

Valuation multiples obey to a relative valuation (Massari et al., 2014), and were defined by Suozzo et al. (2001, p.3) as “simply an expression of market value relative to a key statistic that is assumed to relate to that value.” They have received different classifications:

- a value and equity multiples (Damodaran, 2006)
- b price and enterprise multiples (Bernström, 2014)
- c trading and transaction multiples (Agar, 2005).

Nonetheless, in the studies listed further below, they are used indistinctly of their classifications.

Liu et al. (2002) studied companies in the USA and concluded that the best multiple to estimate the price of the stock is the price to earnings ratio (PER), followed by those based on dividends and CF. They considered the ones based on sales as the worst. Similar results were found through a survey among CFA Institute members, who suggested the PER and dividend discount models (DDM) as the best valuation tools (Pinto et al., 2019). Alford (1992) also studied companies in the USA and backed the PER (Boatsman and Baskin, 1981; LeClair, 1990) and discarded accounting multiples such as the return on assets (ROA) and return on equity (ROE).

Gill (2003) warned about the PER, adducing that it should be accompanied by earnings per share (EPS) analysis (Yooyanyong et al., 2020). Also, Plenborg and Pimentel (2016) pointed out several considerations regarding the use of multiples, being three of them the most important: firms should be:

- a comparable
- b of similar size (Cheng and McNamara, 2000)
- c liquid (Bolsa de Valores de Lima, 2018).

Zhong (2016) concluded for oil companies that the dividend payout ratio (DPR) and the cost efficiency (CE) were the most explanatory ratios of the stock price, discarding:

- a earnings before interests and taxes (EBIT)
- b ROA
- c ROE (Alford, 1992)
- d free cash flow (FCF) as valid multiples.

Salmanov et al. (2015) discarded the PER and supported the price to book value (PBV), while Bagna and Ramusino (2017) stated that the best valuation multiple is the enterprise value to earnings before interests, taxes, depreciation and amortisation (EV/EBITDA) for their studied European companies.

Damodaran (2013) seconded the PER and the PBV studying financial companies. Ball et al. (2019) stated that the PBV is valid but not because of contributed capital, but because of the behaviour of retained earnings. Calomiris and Nissim (2014) suggested market value instead of book value multiples in the USA, while Nissim (2013) proposed exactly the opposite for the same country. Goh et al. (2015) determined for Malaysia that the PER explained better the stock prices, although Krupasinidhu (2017) proposed as the best multiples for that same country the EPS, economic value added (EVA) and DPR, leaving behind the ROA, ROE, return on capital employed (ROCE) and net operating profit after tax (NOPAT). Yin et al. (2018) reached the conclusion that the PER was the best multiple for the USA. Nel et al. (2014) proposed the PER for South Africa and left aside EBITDA and EBIT.

In India, several conclusions have been stated. Tiwari (2016) reached that the PER and PBV were the best explanatory multiples, leaving behind the multiples based on sales, and even the FCF. Sehgal and Pandey (2010) agreed with Tiwari's (2016) findings. Nevertheless, Gupta (2018) proposed the PBV as a strong explanatory multiple, seconded Krupasinidhu (2017) with the EPS and added the EBITDA per share (EBITDA/Share) and the CE as valid valuation multiples.

Zelazowski (2015) studied companies in Poland and concluded that the PER and the PBV are the best multiples that explain the price of the stock, while the EV/EBITDA did not offer good results. In spite of those findings, this last discarded multiple was defended by Trusculescu et al. (2015), along with the EV to sales (EV/sales). Similar results were reached by Stancu et al. (2017) in Romania defending the EV/EBITDA and the PER as good price estimators, while Chullen et al. (2015) proposed the EV/EBITDA and the EV/EBIT [as also defended by Lee and Zumwalt (1981) in the USA].

Serra and Fávero (2017) indicated for Brazil that the EV to assets (EV/Assets) and the PBV were the most explanatory valuation multiples. Lie and Lie (2002) also supported the EV/Assets, plus the EV/EBITDA for the USA [although Zhong (2016) stated that multiples based on assets were not useful]. Trejo et al. (2015) concluded for Mexico that the PER, EV/EBITDA and PBV were the best valuation multiples, leaving aside the FCF. Laing and Dunbar (2015) found for Australia that the EVA was not relevant (Maditinos et al., 2009), and seconded Gupta (2018) and Krupasinidhu (2017) with the PBV, EPS and EBITDA/Share considering them good stock price estimators.

2.3 Geographic, size and industry implications on valuation with multiples

The PER, PBV, EV/EBITDA and EV/EBIT seem to be the most popular and defended multiples in the literature, according to the previous subsection. However, a specific group of valuation multiples for emerging countries is composed by the PER, PBV, EV/EBITDA, CE, EV/Assets, EPS and EBITDA/Share. Therefore, they will separately compose the two models to be further tested. Besides, this procedure is supported by Omran (2003) who stated that those multiples that explain the behaviour of the stock price in developed countries, does not necessarily do for emerging ones. The author also pointed out that it is not clear which factors can influence those differences, nor which kind of adjustments are necessary to apply successfully and without biases the valuation multiples in emerging countries.

Klein and Scheibel (2012) studied the same companies in the USA and Europe and found a discount prime of 5%. The authors attributed this difference to initial public offering expenses not incurred in the USA that must be assumed by European countries.

Serra and Fávero (2017) also stated that, by studying stock valuation in Brazil and the USA, there were strong differences among the explanatory multiples. Regarding industries, Alford (1992) defended the segmentation of stock valuation by industry. Notwithstanding, Damodaran (2013) and Nissim (2013) studied the same industry in the same country, and found different results. The first author defended the PER and the PBV, while the second author only defended the book value multiples.

Company size is also relevant when valuating stocks. Cheng and McNamara (2000) and Lie and Lie (2002) found that when companies are bigger, valuations using multiples are more precise and effective (Welc, 2012), particularly for small and medium enterprises (SMEs) when analysed in the same geography (Mate and Occhino, 2020). The definition of a big company in Peru though is ambiguous: medium size companies (for taxable matters) are those with up to 2,300 taxable units of revenue (a standard monetary unit determined annually by the government) which represented in 2018 around US\$2.9 million (Law 30056) (Congreso de la República del Perú, 2013). Reinforcing the relative definition, Urmeneta (2016) stated that a big company in Peru has annual sales of US\$3 million, while in Brazil should have annual sales of US\$41 million. Chile (US\$4.6 million) and Paraguay (US\$20 million) also contribute to an uncertain and paradoxical delimitation.

2.4 Main techniques to identify relevant multiples

Definitely, the main technique used by researchers to identify which valuation multiples best explain the company's stock price is the multiple linear regression. However, Altman (1968) warned about not treating valuation multiples linearly, but through multivariate techniques. Among the authors that used that methodology, they whether treated as their dependent variable:

- a the stock price of the company (Laing and Dunbar, 2015; Liu et al., 2002; Nissim, 2013; Salmanov et al., 2015; Yin et al., 2018)
- b the whole firm value (Bagna and Ramusino, 2017; Calomiris and Nissim, 2014; Chullen et al., 2015; Damodaran, 2005; Goh et al., 2015; Tiwari, 2016; Trusculescu et al., 2015; Zelazowski, 2015)
- c the stock return (Lee and Zumwalt, 1981; Serra and Fávero, 2017; Trejo et al., 2015; Zhong, 2016)
- d the created shareholder value (Krupasindhu, 2017).

2.5 Horizons of analysis

Regarding the timeframes of analysis, only Nissim (2013) and Boatsman and Baskin (1981) analysed information of 20 years or more. The rest of authors were under that time horizon. The timeframes of analysis are divided as follows:

- a two papers of 20 years or more (Boatsman and Baskin, 1981; Nissim, 2013)
- b thirteen papers between 10 and 19 years (Bagna and Ramusino, 2017; Calomiris and Nissim, 2014; Chullen et al., 2015; Greenberg et al., 1986; Krupasindhu, 2017; Lee

and Zumwalt, 1981; Liu et al., 2002; Nel et al., 2014; Sehgal and Pandey, 2010; Stancu et al., 2017; Tiwari, 2016; Trejo et al., 2015; Yin et al., 2018)

- c fourteen papers between 1 and 9 years (Alford, 1992; Damodaran, 2013; Gill, 2003; Goh et al., 2015; Gupta, 2018; Laing and Dunbar, 2015; LeClair, 1990; Lie and Lie, 2002; Omran, 2013; Salmanov et al., 2015; Serra and Fávero, 2017; Trusculescu et al., 2015; Zelazowski, 2015; Zhong, 2016).

In the search for longer timeframes, the study of Clout and Willett (2016) arose, who studied 56 years of information, although they only studied the PER, and did not establish a difference between developed and emerging countries.

2.6 *Control dummy variables*

Kim et al. (2018) considered the dividend payment as a very important factor in company valuation. They proposed that companies increase their value when they pay dividends, which coincides with other authors (DeAngelo and DeAngelo, 2006; Farinha et al., 2018). Nevertheless, an important clarification regarding dividends was stated by Pelcher (2019), who found that the DPR was not significantly associated with price volatility, but dividend yield, defined as the dividend payment divided by price, was highly related to price volatility.

From an ownership perspective, a company's capital can be national or foreign. Bena et al. (2017) determined that foreign capital has a strong impact on:

- a long-term tangible, intangible and human capital
- b innovation
- c internationalisation of the operations
- d company valuation.

According to the authors, those companies with an important foreign portion of its capital should be more valuable in the market.

Regarding exogenous variables and economical seasonal behaviour, only Liu (2015) controlled for the monthly cyclical economic behaviour of the USA through the National Bureau of Economic Research (NBER) business cycle (World Bank, 2018a, 2018b). Although, Damodaran (2013) controlled by:

- a risk
- b growth
- c cash flow
- d loan liquidity.

Finally, there are no references regarding commodity-related businesses. Nevertheless, this factor was validated through an interview with financial expert Mrs. Lilian Rocca (interview with Mrs. Lilian Rocca, 23 January 2019), former president of the *Superintendencia del Mercado de Valores* (the equivalent in Peru to the Securities and Exchange Commission in the USA) who stated that commodities influence strongly the Peruvian Stock Exchange. Seminario (2015) indicated in his Peruvian history compilation that Peru has been a purely extractivist economy since 1700 to date.

3 Method

The study had a quantitative approach and an explanatory scope, through a panel data multiple linear regression. In particular, the method used by Trejo et al. (2015) served as a good reference for the longitudinal time series model for four reasons:

- a the model is simple
- b it considers a small number of variables
- c it revised for multicollinearity appropriately
- d it used panel data for the regression.

Even though its method is rigorous, its highest adjusted R^2 is only 0.168. However, the research aimed to a much better adjusted R^2 based on its design and thorough delimitation, which was accomplished. The information was collected through the *Economica* database provided through CENTRUM PUCP Business School between May 1st and May 15th, 2019.

The independent variables object of study were, for the first multiple linear regression (Model 1), the four valuation multiples that the literature suggested as the most defended ones:

- a PER
- b PBV
- c EV/EBITDA
- d EV/EBIT.

For the second multiple linear regression (Model 2), the independent variables were seven, those more applicable for emerging countries:

- a PER
- b PBV
- c EV/EBITDA
- d CE
- e EV/Assets
- f EPS
- g EBITDA/Share.

Both models were controlled through:

- a dividend payment
- b national or foreign ownership
- c GDP growth
- d commodity-related business.

The dependent variable for both models was the price of the stock.

3.1 *Research questions and hypotheses*

The study proposed three main research questions, according to the literature review:

Question 1 How strongly does Model 1 explain the studied companies' stock prices?

Question 2 How strongly does Model 2 explain the studied companies' stock prices?

Question 3 Which model explains better the studied companies' stock prices?

The corresponding hypotheses are the following ones:

Hypothesis 1 Model 1 will strongly explain the studied companies' stock price.

Hypothesis 2 Model 2 will strongly explain the studied companies' stock price.

Hypothesis 3 Model 2 will explain better than Model 1 the studied companies' stock prices.

3.2 *Population and sample*

The population is composed by all the companies that are publicly listed in the Peruvian Stock Exchange. The resulting convenience sample was bounded enough to comply with the research's objectives. The delimitations were the following:

- a companies that are among the first half of the BVL liquidity index (Bolsa de Valores de Lima, 2018)
- b publicly listed for at least the past 15 years
- c with annual revenues in 2017 of at least US\$50 million, since the definition of a big company in Peru is ambiguous (Cheng and McNamara, 2000; Lie and Lie, 2002; Welc, 2002) according to the *Peru top 10,000* database (Congreso de la República del Perú, 2013; Urmeneta, 2016).

Only common stocks remained after those delimitations. Junior mining companies (which are in an exploratory stage) were excluded because the study searched for stock prices that reflected the financial performance of their ongoing companies, and junior mining companies are considered extremely volatile (Bolsa de Valores de Lima, 2018; Lie and Lie, 2002).

The 28 companies studied are classified among the following industries:

- a finance (six companies)
- b agroindustry and farming (four companies)
- c energy and water (three companies)
- d mining (three companies)
- e beverage (two companies)
- f commerce (two companies)
- g mining non-metallic (two companies)
- h construction (one company)

- i fishing (one company)
- j food (one company)
- k metalwork (one company)
- l real estate (one company)
- m telecom (one company).

Since a 20-year timeframe will be analysed, 560 data records were expected. Nevertheless, six companies did not offer information for certain years, reason why 539 data records were collected (96.25% of the total expected information).

3.3 Statistical analysis

As per Trejo et al.'s (2015) model, the two models built for the research are the following ones:

- Model 1

$$Price_{ij} = \alpha + \beta_1 PER_{ij} + \beta_2 PBV_{ij} + \beta_3 EV/EBITDA_{ij} + \beta_4 EV/EBIT_{ij} + \beta_5 DIV_{ij} \\ + \beta_6 FOR_{ij} + \beta_7 GDP_j + \beta_8 COMM_{ij} + \varepsilon$$

- Model 2

$$Price_{ij} = \alpha + \beta_1 PER_{ij} + \beta_2 PBV_{ij} + \beta_3 EV/EBITDA_{ij} + \beta_4 CE_{ij} + \beta_5 EV/Assets_{ij} \\ + \beta_6 EPS_{ij} + \beta_7 EBITDA/Share_{ij} + \beta_8 DIV_{ij} + \beta_9 FOR_{ij} + \beta_{10} GDP_j \\ + \beta_{11} COMM_{ij} + \varepsilon$$

The variables contained inside both regressions are defined as follows:

$PRICE_{ij}$	price of the stock of company i at the end of year j
α	the intercept (constant) for the regression
PER_{ij}	the price to earnings ratio for company i in year j
PBV_{ij}	the price to book value for company i in year j
$EV/EBITDA_{ij}$	the enterprise value to EBITDA for company i in year j
$EV/EBIT_{ij}$	the enterprise value to EBIT for company i in year j
CE_{ij}	the cost efficiency for company i in year j
$EV/Assets_{ij}$	the enterprise value to assets for company i in year j
EPS_{ij}	the earnings per share for company i in year j
$EBITDA/Share_{ij}$	the EBITDA to shares outstanding for company i in year j
DIV_{ij}	company i announces (1) or does not (0) in period $j - 1$ a dividend payment for period j

FOR_{ij}	company i is mainly owned by foreign (1) or national (0) capital in year j
GDP_j	Peru's GDP grew more (1) or less (0) than the world's GDP in year j
$COMM_{ij}$	company i 's main business is related to commodities (1) or not (0) in year j
ε	the error in the regression.

The validity of the research is sustained in the thorough literature review which led to the main valuation multiples and dummy variables that should be tested. Regarding the reliability of the multiple linear regression, four statistical tests will be conducted:

- adjusted R^2 , which should be higher than 0.70 (Cea, 2002; Véliz, 2017)
- variance inflation factor (VIF) to measure multicollinearity, and accepted up to 10 (Cea, 2002; Hair et al., 2010)
- Chow test for stability of parameters, which would be considered stable up to an indicator of 4 (Boatsman and Baskin, 1981; Chow, 1960; Clout and Willett, 2016)
- ANOVA test for homoscedasticity, whose p-values should not be less than 0.05 (Hair et al., 2010).

The panel data, specifically time series, is unbalanced because of the unavailability of certain information in the Peruvian Stock Exchange as stated previously (only 3.75% of the total expected information was unavailable). Out of the 28 companies studied from 1999 to 2018 which generated 539 records in total, six companies lacked some information. This companies were CVERDEC1 (for year 1999), RIMSEGC1 (for years 1999 and 2000), FALABEC1 (for years 1999 to 2004), POSITIC1 (for years 1999 and 2000), LAREDOC1 (for years 1999 to 2001), and SNJACIC1 (for year 1999), which means that for the first ten-year horizon there are 259 items available for analysis, while for the second ten-year timeframe, the 280 expected items are available (only a difference of additional 21 items in the second ten-year timeframe). This, though, did not impact the regressions' R^2 , showing robustness and trustworthiness at all times.

Finally, the pooled panel regressions assume that the resulting coefficients are all the same for each company, including the intercepts. A Hausman test was conducted for the panel data multiple linear regressions with p-values higher than 0.05, which suggest a non-significant risk of endogeneity plus the confirmation of a random effects model (Bliese et al., 2020). This model complies with the research's objectives and design. The study also lets a much better understanding of the price formations in emerging countries such as Peru.

4 Results

Models 1 and 2 were tested under a panel data multiple linear regression, and offered the adjustment results shown in Table 1. Model 1 had an adjusted R^2 of 0.300. Model 2 offered an adjusted R^2 of 0.777. Therefore, the hypotheses can be now validated. Regarding the first one, it must be rejected, since Model 1 did not reach an adjusted R^2 of

at least 0.70 (Cea, 2002; Véliz, 2017), and thus, statistically does not strongly explain the price of the stock. The second hypothesis cannot be rejected because of the adjusted R^2 of 0.777 presented by Model 2. Therefore, the third hypothesis cannot be rejected either: Model 2 explains better the price of the stocks studied than Model 1.

Table 1 Adjustment of Models 1 and 2

<i>Model adjustment</i>	<i>Model 1</i>	<i>Model 2</i>
R	0.557	0.884
R^2	0.310	0.781
Adjusted R^2	0.300	0.777

Table 2 evidences that all the variables involved in Models 1 and 2 showed low multicollinearity through their VIF values, all of them being less than 10 (Cea, 2002; Hair et al., 2010). Model 1 offered three elements with p-values less than 0.05:

- a constant
- b PBV
- c FOR, although at a significance level of 90%, also the COMM would also explain the price of the stock.

Model 2 offered six variables with p-values less than 0.05:

- a PBV
- b CE
- c EV/Assets
- d EPS
- e EBITDA/Share
- f COMM.

The DIV and the FOR variables are statistically relevant for that model at a significance level of 90%.

Nonetheless, the information analysed obeys to 20 years, and represented 539 data records. That is why it was important to evaluate parametric stability through a Chow test (Boatsman and Baskin, 1981; Chow, 1960; Clout and Willett, 2016). The Chow test for Model 2 (the best fitted model) is shown in Table 3. The first scenario evaluated through the residual sum of squares (RSS) involved two subsegments of ten years each, while the second scenario considered four subsegments of five years each. According to Gujarati and Porter (2009), a Chow test should not be higher than 4 for parametric stability. The test evidenced that it is better to study two subsegments of ten years each, since they showed better parametric stability (Chow test less than 4). That is why two separate panel data multiple linear regressions based on Model 2 were run: one for the period of 1999–2008 and another for 2009–2018. The sub-timeframe's results are shown in Tables 4 and 5.

Table 2 Coefficients, significance and multicollinearity for Models 1 and 2 (see online version for colours)

<i>Coefficients, significance and VIF</i>	<i>Model 1</i>	<i>Model 2</i>	<i>Coefficients, significance and VIF</i>	<i>Model 1</i>	<i>Model 2</i>
Constant	-5.462	-2.192	EPS (coefficient)	.	1.579
Sig.	0.039	0.148	Sig.	.	0.000
VIF	.	.	VIF	.	5.939
PER (coefficient)	0.011	0.011	EBITDA/share (coefficient)	.	0.596
Sig.	0.430	0.174	Sig.	.	0.000
VIF	1.021	1.005	VIF	.	5.925
PBV (coefficient)	4.570	1.531	DIV (coefficient)	2.989	1.979
Sig.	0.000	0.000	Sig.	0.150	0.093
VIF	1.091	2.300	VIF	1.102	1.112
EV/EBITDA (coefficient)	-0.001	0.000	FOR (coefficient)	7.238	1.834
Sig.	0.519	0.564	Sig.	0.000	0.064
VIF	8.101	1.043	VIF	1.090	1.148
EV/EBIT (coefficient)	0.003	.	GDP (coefficient)	-0.301	0.252
Sig.	0.241	.	Sig.	0.872	0.810
VIF	8.100	.	VIF	1.014	1.020
CE (coefficient)	.	-4.238	COMM (coefficient)	3.080	4.553
Sig.	.	0.000	Sig.	0.063	0.000
VIF	.	1.209	VIF	1.110	1.224
EV/assets (coefficient)	.	1.875			
Sig.	.	0.003			
VIF	.	2.652			

Notes: The bold numbers are p-values with a 95% significance level.
The red numbers are negative numbers.

Table 3 Chow test for Model 2

<i>Regression timeframe</i>	<i>RSS</i>	<i>Chow test</i>
1999–2018	55,530.625	
1999–2008	22,920.216	2.14
2009–2018	30,190.823	
1999–2003	7,751.536	6.78
2004–2008	14,182.469	
2009–2013	20,061.732	
2014–2018	6,538.346	

Table 4 Adjustment of ten-year subsegments of Model 2

<i>Model adjustment</i>	<i>1999–2008</i>	<i>2009–2018</i>
R	0.648	0.924
R ²	0.420	0.855
Adjusted R ²	0.395	0.849

Table 4 shows that the second subsegment that went from 2009 to 2018 offered a much better adjustment than the first one, with an adjusted R^2 of 0.849 against a 0.395 (Cea, 2002; Véliz, 2017). Also, there were more statistically significant variables at a 95% level for the second subsegment than for the first one (six against five respectively), and that period of 1999–2008 brought a problem that did not arise on the previous analysis: the EPS and the EBITDA/Share showed a high level of multicollinearity according to their VIF tests underlined in Table 5 (Cea, 2002; Hair et al., 2010). Therefore, for a reduced expression of Model 2, only one out the two highly multicollinear variables should be conserved, either the EPS or EBITDA/Share.

Table 5 Coefficients, significance and multicollinearity for ten-year subsegments of Model 2 (see online version for colours)

<i>Coefficients, significance and VIF</i>	<i>1999 to 2008</i>	<i>2009 to 2018</i>	<i>Coefficients, significance and VIF</i>	<i>1999 to 2008</i>	<i>2009 to 2018</i>
Constant	-3.351	-0.706	EPS (coefficient)	-0.724	1.601
Sig.	0.094	0.786	Sig.	0.668	0.000
VIF	.	.	VIF	<u>27.171</u>	6.049
PER (coefficient)	0.013	0.009	EBITDA/Share (coefficient)	1.743	0.577
Sig.	0.211	0.474	Sig.	0.036	0.000
VIF	1.040	1.019	VIF	<u>26.444</u>	6.173
PBV (coefficient)	0.333	1.792	DIV (coefficient)	3.203	0.255
Sig.	0.593	0.000	Sig.	0.031	0.900
VIF	2.531	2.299	VIF	1.208	1.093
EV/EBITDA (coefficient)	-0.001	0.000	FOR (coefficient)	-1.901	4.865
Sig.	0.665	0.490	Sig.	0.175	0.001
VIF	1.058	1.077	VIF	1.146	1.217
EV/EBIT (coefficient)	.	.	GDP (coefficient)	1.339	0.374
Sig.	.	.	Sig.	0.350	0.815
VIF	.	.	VIF	1.139	1.019
CE (coefficient)	-4.884	-4.101	COMM (coefficient)	4.035	4.459
Sig.	0.004	0.002	Sig.	0.004	0.002
VIF	1.245	1.297	VIF	1.327	1.203
EV/Assets (coefficient)	4.526	0.686			
Sig.	0.000	0.413			
VIF	2.872	2.839			

Notes: The bold numbers are p-values with a 95% significance level.

The red numbers are negative numbers.

The underlined numbers are mentioned in the text as high multicollinearity results.

In order to isolate the high multicollinearity from Table 5, two new models were run. The first one is Model 2a, which suppressed the EBITDA/Share, and the second one is Model 2b, which suppressed the EPS. Tables 6 and 7 show the adjustment, coefficients, significance and multicollinearity for Model 2a, and Tables 8 and 9 show the same

corresponding information for Model 2b. Both models coincided in statistically significant independent and dummy variables with Model 2, except for the EPS. Table 5 evidenced high multicollinearity between the EPS and the EBITDA/Share, but the second one showed consistent p-values for both sub timeframes, while the EPS only was strong for the period of 2009–2018. Nonetheless, Models 2a and 2b show that, separately, both variables have p-values of 0.000 for both sub timeframes, and the EPS presented higher coefficients than the EBITDA/Share.

Table 6 Adjustment of Model 2a

<i>Model adjustment</i>	<i>1999–2008</i>	<i>2009–2018</i>
R	0.640	0.919
R ²	0.410	0.845
Adjusted R ²	0.386	0.840

Table 7 Coefficients, significance and multicollinearity for Model 2a (see online version for colours)

<i>Coefficients, significance and VIF</i>	<i>1999 to 2008</i>	<i>2009 to 2018</i>	<i>Coefficients, significance and VIF</i>	<i>1999 to 2008</i>	<i>2009 to 2018</i>
Constant	-1.961	-0.470	EPS (coefficient)	2.770	2.188
Sig.	0.301	0.861	Sig.	0.000	0.000
VIF	.	.	VIF	1.112	1.457
PER (coefficient)	0.012	0.009	EBITDA/Share (coefficient)	.	.
Sig.	0.256	0.500	Sig.	.	.
VIF	1.037	1.019	VIF	.	.
PBV (coefficient)	0.473	1.617	DIV (coefficient)	2.961	0.374
Sig.	0.448	0.000	Sig.	0.047	0.858
VIF	2.502	2.262	VIF	1.200	1.093
EV/EBITDA (coefficient)	-0.001	0.000	FOR (coefficient)	-1.978	5.640
Sig.	0.619	0.350	Sig.	0.161	0.000
VIF	1.057	1.072	VIF	1.145	1.196
EV/EBIT (coefficient)	.	.	GDP (coefficient)	0.643	0.529
Sig.	.	.	Sig.	0.647	0.748
VIF	.	.	VIF	1.078	1.018
CE (coefficient)	-5.498	-4.895	COMM (coefficient)	3.981	3.939
Sig.	0.001	0.000	Sig.	0.005	0.006
VIF	1.208	1.269	VIF	1.326	1.193
EV/Assets (coefficient)	3.997	1.286			
Sig.	0.000	0.131			
VIF	2.706	2.753			

Notes: The bold numbers are p-values with a 95% significance level.
The red numbers are negative numbers.

Table 8 Adjustment of Model 2b

<i>Model adjustment</i>	<i>1999–2008</i>	<i>2009–2018</i>
R	0.648	0.896
R ²	0.420	0.803
Adjusted R ²	0.397	0.795

Table 9 Coefficients, significance and multicollinearity of Model 2b (see online version for colours)

<i>Coefficients, significance and VIF</i>	<i>1999 to 2008</i>	<i>2009 to 2018</i>	<i>Coefficients, significance and VIF</i>	<i>1999 to 2008</i>	<i>2009 to 2018</i>
Constant	-3.062	-1.502	EPS (coefficient)	.	.
Sig.	0.103	0.620	Sig.	.	.
VIF	.	.	VIF	.	.
PER (coefficient)	0.012	0.008	EBITDA/Share (coefficient)	1.397	1.772
Sig.	0.218	0.596	Sig.	0.000	0.000
VIF	1.037	1.019	VIF	1.082	1.487
PBV (coefficient)	0.361	2.254	DIV (coefficient)	3.143	0.188
Sig.	0.558	0.000	Sig.	0.033	0.937
VIF	2.501	2.253	VIF	1.197	1.093
EV/EBITDA (coefficient)	-0.001	0.000	FOR (coefficient)	-1.940	4.231
Sig.	0.655	0.587	Sig.	0.164	0.011
VIF	1.057	1.077	VIF	1.141	1.215
EV/EBIT (coefficient)	.	.	GDP (coefficient)	1.186	-0.246
Sig.	.	.	Sig.	0.392	0.895
VIF	.	.	VIF	1.068	1.017
CE (coefficient)	-4.998	-3.858	COMM (coefficient)	4.025	4.726
Sig.	0.003	0.012	Sig.	0.004	0.004
VIF	1.214	1.296	VIF	1.326	1.203
EV/Assets (coefficient)	4.413	0.752			
Sig.	0.000	0.441			
VIF	2.688	2.838			

Notes: The bold numbers are p-values with a 95% significance level.
The red numbers are negative numbers.

Until now, Model 2 has proven to be more explanatory of the price of the stock than Model 1. However, another important factor to be considered to assure the model's reliability is the ANOVA test to avoid homoscedasticity (Hair et al., 2010). This test was conducted through an F statistic, and according to Hair et al. (2010), its p-value should not be less than 0.05 to be considered heteroscedastic. Table 10 shows the results for Models 1 and 2 regarding their ANOVA tests. The PBV, EV/Assets and DIV show homoscedasticity in their behaviour.

Table 10 ANOVA tests for Models 1 and 2 (1999–2018)

<i>ANOVA (sig. per model)</i>	<i>Model 1</i>	<i>Model 2</i>
Price	0.244	0.244
PER	0.718	0.718
PBV	0.000	0.000
EV/EBITDA	0.586	0.586
EV/EBIT	0.705	.
CE	.	0.990
EV/Assets	.	0.000
EPS	.	0.883
EBITDA/Share	.	0.825
DIV	0.000	0.000
FOR	0.761	0.761
GDP	.	.
COMM	1.000	1.000

Combining all findings from the statistical tests conducted, Model 2 was reduced to Model 3, according to three considerations. First, the PER, EV/EBITDA, DIV, FOR and GDP were suppressed for not being statistically significant at a 95% level. Second, the EBITDA/Share was eliminated for being highly multicollinear with the EPS, and for its weaker coefficients, although with the same p-values. Third, the PBV and EV/Assets were eliminated for being homoscedastic. Therefore, only the CE, EPS and COMM remained in the final model (Model 3).

Table 11 Adjustment of Model 3

<i>Model adjustment</i>	<i>1999–2018</i>
R	0.845
R ²	0.713
Adjusted R ²	0.712

This model turned out being simpler and statistically solvent for four reasons:

- a the model offered an adjusted R² of 0.712 (Table 11) (Cea, 2002; Véliz, 2017)
- b not only the two independent variables and the dummy variable showed p-values close to 0.000, but also the constant did (Table 12)
- c none of the variables presented high multicollinearity (Table 12) (Cea, 2002; Hair et al., 2010)
- d none of the variables evidenced homoscedastic behaviour (Table 13).

Table 12 Coefficients, significance and multicollinearity of Model 3 (see online version for colours)

<i>Coefficients, significance and VIF</i>	<i>1999–2018</i>
Constant	5.230
Sig.	0.000
VIF	.
CE (coefficient)	-2.535
Sig.	0.016
VIF	1.020
EPS (coefficient)	2.604
Sig.	0.000
VIF	1.016
COMM (coefficient)	3.534
Sig.	0.001
VIF	1.032

Notes: The bold numbers are p-values with a 95% significance level.
The red numbers are negative numbers.

Table 13 ANOVA tests for Model 3

<i>ANOVA (sig. per model)</i>	<i>Model 3</i>
Price	0.244
CE	0.990
EPS	0.883
COMM	1.000

After all the delimitations according to the previous models, the final model is proposed below. It includes the CE, EPS and COMM as its independent variables, being the COMM a novel contribution for emerging countries' stock valuation.

- Model 3

$$PRICE_{ij} = \alpha + \beta_1 CE_{ij} + \beta_2 EPS_{ij} + \beta_3 COMM_{ij} + \varepsilon.$$

5 Discussion

Probably the most surprising finding is that the PER is not relevant at all in an emerging market such as Peru in any of the presented models. This multiple was defended by the great majority of literature, but it was also included among the preferred ones for emerging countries such as Malaysia, India, Brazil or Mexico (Goh et al., 2015; Serra and Fávero, 2017; Tiwari, 2016; Trejo et al., 2015). Nevertheless, Gill (2003) warned about the PER, suggesting that it should be accompanied by the EPS (Koller et al., 2010). In the case of Model 3, the EPS figured without the PER. Damodaran (2013) also defended the

PER, but this only proved what Omran (2003) stated about how delicate and different the stock valuation can be in developed versus emerging countries, and that there is not yet an agreement regarding how to value stocks in the second ones (Bruner et al., 2002).

Regarding the PBV, it was also defended by researchers who studied developed and emerging countries. It ended up being statistically significant, but homoscedastic. However, Ball et al. (2019) pointed out that the PBV is explanatory not because of contributed capital, but because of retained earnings as an indicator of the company's capacity to generate results. The paradox is that, if the PBV is a relevant explanatory ratio, then the DIV (DeAngelo and DeAngelo, 2006; Kim et al., 2018; Pelcher, 2019) should not be one, since retained earnings grow as long as dividends are not paid. Definitely, this opens a new door for future research regarding the relation between the PBV and the DIV.

Whether it is through EBITDA or EBIT, the EV is not a good stock price estimator for an emerging country, although the only research in an emerging economy that considered the EV/EBITDA was Trejo et al.'s (2015) in Mexico. The EV/Assets (Lie and Lie, 2002) though, would have remained in the final model if it was not for homoscedasticity, considering that it was successfully used for stock valuation in Brazil (Serra and Fávero, 2017). On the other hand, the CE remained in the final model with a coefficient of -2.535 . Its negative sign makes sense since an increase in cost of sales versus assets would denote a less efficient use of the last ones. Only two authors proposed it (Gupta, 2018; Zhong, 2016), and it looks very much as the counterpart of the asset turnover ratio (ATR), as defined in the DuPont analysis (Rao et al., 2019). Nevertheless, not only any author proposed the ATR as a valid valuation multiple, but as a component of the ROA, and since both ROA and ROE were discarded by the literature (Alford, 1992; Krupasindhu, 2017; Zhong, 2016), the CE appeared as a new way of estimating the efficiency of assets, which relates at the same time with stock valuation.

The study conducted by Gupta (2018) gave lights regarding how the PBV, EPS and EBITDA/Share could coexist in the same model. The timeframe, though, could have had a strong influence over that fact, since the author analysed only three years of information and did not segment its data for parametric stability. Therefore, the subsegmented VIF results for the EPS and EBITDA/Share could not have been evidenced in Gupta's (2018) study. Although:

- a both multiples relate to operational results for stockholders
- b have the shares outstanding as their denominators
- c are both statistically relevant separately.

Then, the EBITDA/Share could still be relevant under other research delimitations. This is an important questioning considering next paragraph's discussion, since Peru's economy is highly dependent of the exportation of commodities (Gustafsson and Scurrah, 2019; Seminario, 2015), while India is a strong importer of raw materials for its industries (Piñero et al., 2019).

Regarding the four dummy variables used to control for additional factors, the first one (DIV) (DeAngelo and DeAngelo, 2006; Kim et al., 2018; Pelcher, 2019) relates to the paradoxical situation explained previously and that involved also the retained earnings inside the PBV. Therefore, the behaviour of the earnings generated and the dividend policy should be studied separately against stock valuation (Ball et al., 2019).

The FOR (Bena et al., 2017) relates with how foreign investors promote research and development (R&D), as well as investment in long-term assets. The variable did not explain the behaviour of the stocks in Peru, and this does not necessarily mean that in Peru, there is a lack of investment in fixed assets, or no money destined to R&D. Notwithstanding, Bena et al.'s (2017) research could be a reflection of the current situation of the R&D in Peru, which represents a 0.10% of its GDP (UNESCO, 2019). The GDP growth (Liu, 2015), was not relevant at all because Peru's GDP grew at a faster rate than the World's GDP during 15 out of the 20 years studied (World Bank, 2018a, 2018b).

Definitely, the most relevant and successful dummy variable in the study was that which was not found in any paper or research regarding valuation multiples, but only in a Peruvian history book by Seminario (2015), and mentioned during an interview with financial expert Mrs. Lilian Rocca: the COMM (interview with Mrs. Lilian Rocca, 23 January 2019). If a company's main business is related to commodities or not confirmed not only what Mrs. Lilian Rocca stated, but it is also the main element in Model 3 (except for the constant) with a coefficient of 3.534, and a p-value of 0.001. Peru, as many emerging extractivist countries, depends on the international price of commodities, and this represents an opportunity, and at the same time, a challenge (Gustafsson and Scurrah, 2019). However, commodities have a very strong influence on the Peruvian Stock Exchange, and represent a novel contribution in stock valuation regarding emerging countries.

6 Final considerations

There is not a formal agreement about which valuation multiples should be used for stock valuation, partially because the previous findings from researchers are not being considered, and there is still an 'exploratory' effort to reach the ideal multiples. The best proof of this is that the most defended valuation multiple (PER) was discarded from every single model tested. Appropriate geographic and company size delimitations, plus suitable statistical validations decanted in Model 3. The remaining variables in that model strongly explain the stock prices and seem to complement themselves well:

- a CE is related to the efficiency of assets, not from a sales generation perspective, but in an efficient usage of the cost of sales
- b EPS focuses on the final earnings available
- c COMM reflects the risk and potential operative leverage related to the volatility of the commodities' international prices, which represents a novel contribution to stock valuation through valuation multiples.

The theoretical implications are clear: research should be focused on what has already been concluded by others, and a thorough delimitation and rigorous statistical testing will definitely bring better results in the future. Model 3 should be replicated in other emerging countries to test its validity, and should be complemented and adapted according to the findings in other emerging markets. Regarding the practical implications, there are four:

- a The CE variable should invite managers and decision-makers to focus more on their cost structure, and not necessarily on sales, since sales not only do not appear in the model, but were discarded by several authors in the literature as valid valuation multiples.
- b The EPS shows, in combination with the discarded DIV, that even if those earnings are not paid as dividends, the profit-generating potential seems to be more appreciated by investors than the dividend payment itself and considered enough evidence of value creation for investors, which should also be noticed by managers, mostly for its financing implications regarding profit reinvestment.
- c The COMM variable should not make decision-makers take their businesses to be commodity-related, but it should serve as an opportunity identifier.
- d Investment analysts and particular investors should use Model 3 for quick valuations in emerging countries.

It is recommended that Model 3 be considered for valuations in extractivist emerging countries, and that the model be updated throughout time in order to reflect the different market instances. New findings should complement the model, considering that two variables with strong p-values were discarded for reasons that could not apply in other emerging markets: the EV/Assets was discarded for homoscedasticity, and the EBITDA/Share was discarded for high multicollinearity with the EPS. There is also an opportunity to study the CE under the DuPont analysis, against the ATR. Finally, there seems to be a relation between the PBV and the DIV. Therefore, the retained earnings (as a component of equity) should be studied against the dividend payment to see which one has more influence on stock valuation.

Disclaimer

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

- Agar, C. (2005) *Capital Investment and Financing: A Practical Guide to Financial Evaluation*, Elsevier, Oxford, UK, ISBN: 978-0-7506-6532-2.
- Alford, A.W. (1992) 'The effect of the set of comparable firms on the accuracy of the price-earnings valuation method', *Journal of Accounting Research*, Vol. 30, No. 1, pp.94–108 [online] <http://www.jstor.org/stable/2491093> (accessed 15 July 2018).
- Altman, E. (1968) 'Financial ratios, discriminant analysis and the prediction of corporate bankruptcy', *The Journal of Finance*, Vol. 23, pp.589–609, DOI [online] <https://doi.org/10.1111/j.1540-6261.1968.tb00843.x>.
- Bagna, E. and Ramusino, E.C. (2017) 'Market multiples and the valuation of cyclical companies', *International Business Research*, Vol. 10, No. 12, pp.246–266, DOI [online] <https://doi.org/10.5539/ibr.v10n12p246>.
- Ball, R., Gerakos, J., Linnainmaa, J.T. and Nikolaev, V. (2019) 'Earnings, retained earnings, and book-to-market in the cross section of expected returns', *Journal of Financial Economics*, Vol. 2019, pp.1–64, DOI [online] <https://doi.org/10.1016/j.jfineco.2019.05.013>.

- Beisland, L.A. (2014) 'Equity valuation in practice: the influence of net financial expenses', *Accounting Forum*, Vol. 38, No. 2014, pp.122–131, DOI [online] <https://doi.org/10.1016/j.accfor.2013.04.008>.
- Bena, J., Ferreira, M.A., Matos, P. and Pedro, P. (2017) 'Are foreign investors locusts? The long-term effects of foreign institutional ownership', *Journal of Financial Economics*, Vol. 126, No. 1, pp.122–146, DOI [online] <https://doi.org/10.1016/j.jfineco.2017.07.005>.
- Bernström, S. (2014) *Valuation: The Market Approach*, Wiley Finance Series, West Sussex, UK, ISBN: 978-1-1189-0392-6.
- Bliese, P.D., Schepker, D.J., Essman, S.M. and Ployhart, R.E. (2020) 'Bridging methodological divides between macro-and microresearch: endogeneity and methods for panel data', *Journal of Management*, Vol. 46, No. 1, pp.70–99, DOI [online] <https://doi.org/10.1177/0149206319868016>.
- Boatsman, J.R. and Baskin, E.F. (1981) 'Asset valuation with incomplete markets', *The Accounting Review*, Vol. 56, No. 1, pp.38–53, DOI [online] <https://doi.org/10.1080/00014788.1975.9728650>.
- Bolsa de Valores de Lima (2018) *Metodología para el cálculo del índice de liquidez de los valores de renta variable listados en la BVL* [online] <https://www.bvl.com.pe/estadist/IndLiq.html> (accessed 26 September 2018).
- Brown, G.W. and Cliff, M.T. (2004) 'Investor sentiment and the near-term stock market', *Journal of Empirical Finance*, Vol. 11, No. 2004, pp.1–27, DOI [online] <https://doi.org/10.1016/j.jempfin.2002.12.001>.
- Bruner, R.F., Conroy, R.M., Estrada, J., Kritzman, M. and Li, W. (2002) 'Introduction to valuation in emerging markets', *Emerging Markets Review*, Vol. 3, No. 4, pp.310–324, DOI [online] [https://doi.org/10.1016/S1566-0141\(02\)00039-0](https://doi.org/10.1016/S1566-0141(02)00039-0).
- Calomiris, C.W. and Nissim, D. (2014) 'Crisis-related shifts in the market valuation of banking activities', *Journal of Financial Intermediation*, Vol. 23, No. 3, pp.400–435, DOI [online] <https://doi.org/10.1016/j.jfi.2014.05.002>.
- Cea, M.A. (2002) *Análisis multivariable: Teoría y práctica en la investigación social*, Editorial Síntesis, Madrid, Spain, ISBN: 978-8-4773-8943-9.
- Cheng, C. and McNamara, R. (2000) 'The valuation accuracy of the price-earnings and price-book benchmark valuation methods', *Review of Quantitative Finance and Accounting*, Vol. 15, No. 4, pp.349–370, DOI [online] <https://doi.org/10.1023/a:1012050524545>.
- Choi, J.H., Choi, S., Myers, L.A. and Ziebart, D. (2019) 'Financial statement comparability and the informativeness of stock prices about future earnings', *Contemporary Accounting Research*, Vol. 36, No. 1, pp.389–417, DOI [online] <http://doi.org/10.1111/1911-3846.12442>.
- Chow, G.C. (1960) 'Tests of equality between sets of coefficients in two linear regressions', *Econometrica*, Vol. 28, No. 3, pp.591–605 [online] <https://www.jstor.org/stable/1910133> (accessed 9 May 2019).
- Chullen, A., Kaltenbrunner, H. and Schwetzler, B. (2015) 'Does consistency improve accuracy in multiple-based valuation?', *Journal of Business Economics*, Vol. 85, No. 6, pp.635–662, DOI [online] <https://doi.org/10.1007/s11573-015-0768-2>.
- Clout, V.J. and Willett, R.J. (2016) 'Earnings in firm valuation and their value relevance', *Journal of Contemporary Accounting & Economics*, Vol. 12, No. 3, pp.223–240, DOI [online] <https://doi.org/10.1016/j.jcae.2016.09.005>.
- Congreso de la República del Perú (2013) *Law 30056. Ley que modifica diversas leyes para facilitar la inversión, impulsar el desarrollo productivo y el crecimiento empresarial* [online] https://www.proinversion.gob.pe/RepositorioAPS/0/0/arc/ML_GRAL_INVERSION_LEY_30_056/Ley%20N%2030056.pdf (accessed 18 September 2018).
- Damodaran, A. (2005) 'Valuation approaches and metrics: a survey of the theory and evidence', *Foundations & Trends in Finance*, Vol. 1, No. 8, pp.693–784, DOI [online] <https://doi.org/10.1561/05000000013>.

- Damodaran, A. (2006) *Damodaran on Valuation: Security Analysis for Investment and Corporate Finance*, 2nd ed., John Wiley & Sons, Hoboken, NJ, ISBN: 978-0-4717-5121-2.
- Damodaran, A. (2012) *Investment Valuation: Tools and Techniques for Determining the Value of Any Asset*, 3rd ed., John Wiley & Sons, Hoboken, NJ, ISBN: 978-1-1180-1152-2.
- Damodaran, A. (2013) 'Valuing financial service firms', *The Journal of Financial Perspectives*, Vol. 1, No. 1, pp.1–34 [online] <https://EconPapers.repec.org/RePEc:ris:jofipe:0001> (accessed 10 October 2018).
- DeAngelo, H. and DeAngelo, L. (2006) 'The irrelevance of the MM dividend irrelevance theorem', *Journal of Financial Economics*, Vol. 79, No. 2, pp.293–315, DOI [online] <https://doi.org/10.1016/j.jfineco.2005.03.003>.
- Fama, E. (1965) 'The behavior of stock-market prices', *The Journal of Business*, Vol. 38, No. 1, pp.34–105 [online] <https://www.jstor.org/stable/2350752> (accessed 5 November 2018).
- Farinha, J., Mateus, C. and Soares, N. (2018) 'Cash holdings and earnings quality: evidence from the main and alternative UK markets', *International Review of Financial Analysis*, Vol. 56, pp.238–252, DOI [online] <https://doi.org/10.1016/j.irfa.2018.01.012>.
- Fernández, P. (2002) *Valuation Methods and Shareholder Value Creation*, Academic Press, San Diego, CA, ISBN: 978-0-1225-3841-4.
- Festel, G., Wuermseher, M. and Cattaneo, G. (2013) 'Valuation of early stage high-tech start-up companies', *International Journal of Business*, Vol. 18, No. 3, pp.216–231 [online] <https://search.proquest.com/docview/1437954347?accountid=28391> (accessed 12 October 2018).
- Giannini, R., Irvine, P. and Shu, T. (2019) 'The convergence and divergence of investors' opinions around earnings news: evidence from a social network', *Journal of Financial Markets*, Vol. 42, pp.94–120, DOI [online] <https://doi.org/10.1016/j.finmar.2018.12.003>.
- Gill, S. (2003) 'Price-earnings ratio revisited', *Finance India*, Vol. 17, No. 3, pp.937–951 [online] <https://search.proquest.com/docview/224368568?accountid=28391> (accessed 12 October 2018).
- Goh, C., Rasli, A., Dziekonski, K. and Kahn, S. (2015) 'Market-based valuation multiples: evidence from agribusiness sector', *Social Sciences & Humanities*, Vol. 23, No. 1, pp.209–222, ISSN: 2231-8534.
- Greenberg, R.R., Johnson, G.L. and Ramesh, K. (1986) 'Earnings versus cash flow as a predictor of future cash flow measures', *Journal of Accounting, Auditing & Finance*, Vol. 1, No. 4, pp.266–277, DOI [online] <https://doi.org/10.1177/0148558X8600100402>.
- Gujarati, D.N. and Porter, D.C. (2009) *Econometria*, 5th ed., McGraw Hill, Mexico DF, ISBN: 978-6-0715-0294-0.
- Gupta, V. (2018) 'Predicting accuracy of valuation multiples using value drivers: evidence from Indian listed firms', *Theoretical Economics Letters*, Vol. 8, No. 5, pp.755–772, DOI [online] <https://doi.org/10.4236/tel.2018.85052>.
- Gustafsson, M. and Scurrah, M. (2019) 'Unpacking the extractivist state: the role of weak state agencies in promoting institutional change in Peru', *Extractive Industries and Society*, Vol. 6, No. 1, pp.206–214, DOI [online] <https://doi.org/10.1016/j.exis.2018.08.007>.
- Hair, J., Black, W., Babib, B. and Anderson, R. (2010) *Multivariate Data Analysis*, 7th ed., Pearson Education, Mexico City, Mexico, ISBN: 978-0-1381-3263-7.
- Imam, S., Chan, J. and Shah, S.A. (2013) 'Equity valuation models and target price accuracy in Europe: evidence from equity reports', *International Review of Financial Analysis*, Vol. 28, No. 1, pp.9–19, DOI [online] <https://doi.org/10.1016/j.irfa.2013.02.008>.
- Kaplan, S. and Ruback, R. (1995) 'The valuation of cash flow forecasts: an empirical analysis', *The Journal of Finance*, Vol. 4, No. 4, pp.1059–1093, DOI [online] <https://doi.org/10.1111/j.1540-6261.1995.tb04050.x>.
- Kim, S., Park, S. and Suh, J. (2018) 'A J-shaped cross-sectional relation between dividends and firm value', *Journal of Corporate Finance*, Vol. 48, pp.857–877, DOI [online] <https://doi.org/10.1016/j.jcorpfin.2016.09.010>.

- Klein, C. and Scheibel, M. (2012) 'The private company discount from a European perspective: an analysis based on the acquisition approach for comparable transactions of European target companies', *The Journal of Private Equity*, Vol. 16, No. 1, pp.74–82 [online] <https://search.proquest.com/docview/1268715866?accountid=28391> (accessed 12 October 2018).
- Koller, T., Goedhart, M. and Wessels, D. (2010) *Valuation: Measuring and Managing the Value of Companies*, 4th ed., McKinsey & Company, John Wiley & Sons, Hoboken, NJ. ISBN: 978-0471-70-221-4.
- Koubouros, M., Malliaropoulos, D. and Panopoulou, E. (2009) 'Long-run cash flow and discount-rate risks in the cross-section of US returns', *The European Journal of Finance*, Vol. 16, No. 3, pp.227–244, DOI [online] <https://doi.org/10.1080/13518470903102419>.
- Krupasindhu, S. (2017) 'Economic value added and traditional accounting measures for shareholder's wealth creation', *Asian Journal of Accounting and Governance*, Vol. 8, pp.125–136, DOI [online] <https://doi.org/10.17576/AJAG-2017-08-11>.
- Kuncoro, H. (2017) 'Fiscal policy and stock market returns volatility: the case of Indonesia', *International Journal of Economic Policy in Emerging Economies*, Vol. 10, No. 2, pp.153–170, DOI [online] <https://doi.org/10.1504/IJEPEE.2017.085286>.
- Laing, G. and Dunbar, K. (2015) 'EVATM, EPS, ROA and ROE as measures of performance in Australian banks: a longitudinal study', *Journal of Applied Management Accounting Research*, Vol. 13, No. 1, pp.41–48 [online] <https://search.proquest.com/docview/1694456692?accountid=28391> (accessed 12 October 2018).
- LeClair, M.S. (1990) 'Valuing the closely-held corporation: the validity and performance of established valuation procedures', *Accounting Horizons*, Vol. 4, No. 3, pp.31–42 [online] <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=9604010084&site=ehost-live&scope=site> (accessed 15 July 2018).
- Lee, C. and Zumwalt, J. (1981) 'Association between alternative accounting profitability measures and security returns', *Journal of Financial and Quantitative Analysis*, Vol. 16, pp.1–22, DOI [online] <https://doi.org/10.2307/2330667>.
- Lee, C.F. and Junkus, J.C. (1983) 'Financial analysis and planning: an overview', *Journal of Economics and Business*, Vol. 35, Nos. 3–4, pp.259–283, DOI [online] [https://doi.org/10.1016/0148-6195\(83\)90012-7](https://doi.org/10.1016/0148-6195(83)90012-7).
- Lie, E. and Lie, H.J. (2002) 'Multiples used to estimate corporate value', *Financial Analysts Journal*, Vol. 58, No. 2, pp.44–54, DOI [online] <https://doi.org/10.2469/faj.v58.n2.2522>.
- Liu, J., Nissim, D. and Thomas, J. (2002) 'Equity valuation using multiples', *Journal of Accounting Research*, Vol. 40, No. 1, pp.135–172, DOI [online] <https://doi.org/10.1111/j.1475-679X.2011.00398.x>.
- Liu, S. (2015) 'Investor sentiment and stock market liquidity', *Journal of Behavioral Finance*, Vol. 16, No. 1, pp.51–67, DOI [online] <https://doi.org/10.1080/15427560.2015.1000334>.
- Maditinos, D.I., Šević, Ž. and Theriou, N. (2009) 'Performance measures: traditional accounting measures vs. modern value-based measures. The case of earnings and EVA® in the Athens Stock Exchange (ASE)', *International Journal of Economic Policy in Emerging Economies*, Vol. 2, No. 4, pp.323–334, DOI [online] <https://doi.org/10.1504/IJEPEE.2009.030935>.
- Massari, M., Gianfrate, G. and Zanetti, L. (2014) *The Valuation of Financial Companies*, John Wiley & Sons, West Sussex, UK, ISBN: 978-1-1186-1733-5.
- Mate, M. and Occhino, P. (2020) 'A proposal to estimate the valuation of small and medium size companies using geographically comparable information', *Small Business International Review*, Vol. 4, No. 1, pp.34–51, DOI [online] <https://doi.org/10.26784/sbir.v4i1.229>.
- Nel, W.S., Bruwer, W. and Le Roux, N.J. (2014) 'An emerging market perspective on key value drivers in the valuation of cross-borders transactions into South Africa', *Economics, Management, and Financial Markets*, Vol. 9, No. 4, pp.92–111 [online] <https://search.proquest.com/docview/1650863392?accountid=28391> (accessed 15 July 2018).
- Nissim, D. (2013) 'Relative valuation of U.S. insurance companies', *Review of Accounting Studies*, Vol. 18, No. 2, pp.324–359, DOI [online] <https://doi.org/10.1007/s11442-012-9213-8>.

- Omran, M.F. (2003) 'Equity valuation using multiples in the emerging market of the United Arab Emirates', *Review of Middle East Economics and Finance*, Vol. 1, No. 3, pp.267–283, DOI [online] <https://doi.org/10.1080/1475368032000158250>.
- Parra, A. (2013) 'Valoración De Empresas: Métodos De Valoración', *Contexto*, Vol. 2, pp.69–84 [online] <http://revistas.ugca.edu.co/index.php/contexto/article/view/44> (accessed 15 July 2018).
- Pelcher, L. (2019) 'The role of dividend policy in share price volatility', *Journal of Economic and Financial Services*, Vol. 12, No. 1, pp.1–10, DOI [online] <https://doi.org/10.4102/jef.v12i1.221>.
- Piñero, P., Bruckner, M., Wieland, H., Pongrácz, E. and Giljum, S. (2019) 'The raw material basis of global value chains: allocating environmental responsibility based on value generation', *Economic Systems Research*, Vol. 31, No. 2, pp.206–227, DOI [online] <https://doi.org/10.1080/09535314.2018.1536038>.
- Pinto, J.E., Robinson, T.R. and Stowe, J.D. (2019) 'Equity valuation: a survey of professional practice', *Review of Financial Economics*, Vol. 37, No. 2, pp.219–233, DOI [online] <https://doi.org/10.1002/rfe.1040>.
- Plenborg, T. (2002) 'Firm valuation: comparing the residual income and discounted cash flow approaches', *Scandinavian Journal of Management*, Vol. 18, No. 2002, pp.303–318, DOI [online] [https://doi.org/10.1016/S0956-5221\(01\)00017-3](https://doi.org/10.1016/S0956-5221(01)00017-3).
- Plenborg, T. and Pimentel, R.C. (2016) 'Best practices in applying multiples for valuation purposes', *The Journal of Private Equity*, Vol. 19, No. 3, pp.55–64, DOI [online] <https://doi.org/10.3905/jpe.2016.19.3.055>.
- Rao, P., Kumar, S. and Madhavan, V. (2019) 'A study on factors driving capital structure decisions of small and medium enterprises (SMEs) in India', *IIMB Management Review*, Vol. 31, No. 1, pp.37–50, DOI [online] <https://doi.org/10.1016/j.iimb.2018.08.010>.
- Salmanov, O., Babina, N., Bashirova, S. and Samoshkina, M. (2015) 'Multiples for valuation estimates of companies in the technology sector of emerging markets', *Asian Social Science*, Vol. 11, No. 8, pp.253–263, DOI [online] <https://doi.org/10.5539/ass.v11n8p253>.
- Sehgal, S. and Pandey, A. (2010) 'Equity valuation using price multiples: evidence from India', *Asian Academy of Management Journal of Accounting and Finance*, Vol. 6, No. 1, pp.89–108 [online] https://EconPapers.repec.org/RePEc:usm:journl:aamjaf00601_89-108 (accessed 15 July 2018).
- Seminario, B. (2015) *El desarrollo de la economía peruana en la era moderna: precios, población, demanda y producción desde 1700*, Universidad del Pacífico, Lima, Peru, ISBN: 978-9-9725-7332-3.
- Serra, R.G. and Fávero, L.P.L. (2017) 'Multiples' valuation: the selection of cross-border comparable firms', *Emerging Markets Finance and Trade*, Vol. 54, No. 9, pp.1973–1992, DOI [online] <https://doi.org/10.1080/1540496X.2017.1336084>.
- Stancu, I., Obrejabrasoveanu, L., Ciobanu A. and Stancu, A. (2017) 'Are company valuation models the same? A comparative analysis between the discounted cash flows (DCF), the adjusted net asset, value and price multiples, the market value added (MVA) and the residual income (RI) models', *Economic Computation & Economic Cybernetics Studies & Research*, Vol. 51, No. 3, pp.5–20 [online] <http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=125873727&lang=es&site=eds-live&scope=site> (accessed 15 July 2018).
- Sulistiawan, D. and Rudiawarni, F.A. (2019) 'Industrial competition and earnings quality in Indonesia', *International Journal of Economic Policy in Emerging Economies*, Vol. 12, No. 2, pp.121–129, DOI [online] <https://doi.org/10.1504/IJEPEE.2019.099727>.
- Suozzo, P., Cooper, S., Sutherland, G. and Deng, Z. (2001) *Valuation Multiples: A Primer*, UBS Warburg, London, UK [online] <http://www.rgquintero.com/media/91f679831d8e9521ffff80e8ffffe906.pdf> (accessed 15 July 2018).
- Tiwari, R. (2016) 'Intrinsic value estimates and its accuracy: Evidence from Indian manufacturing industry', *Future Business Journal*, Vol. 2, No. 2, pp.138–151, DOI [online] <https://doi.org/10.1016/j.fbj.2016.10.001>.

- Trejo, C.O., Noguera, M. and White, S. (2015) 'Financial ratios used by equity analysts in Mexico and stock returns', *Contaduría y Administración*, Vol. 60, No. 3, pp.578–592, DOI [online] <https://doi.org/10.1016/j.cya.2015.02.001>.
- Trusculescu, A., Draghici, A. and Albuлесcu, C.T. (2015) 'Key metrics and key drivers in the valuation of public enterprise resource planning companies', *Procedia Computer Science*, Vol. 64, pp.917–923, DOI [online] <https://doi.org/10.1016/j.procs.2015.08.608>.
- UNESCO (2019) *Peru: R&D Spending as % of GDP* [online] <http://uis.unesco.org/apps/visualisations/research-and-development-spending/> (accessed 12 July 2019).
- Urmeneta, R. (2016) *Dinámica de las empresas exportadoras en América Latina: El aporte de las Pymes* [online] https://repositorio.cepal.org/bitstream/handle/11362/40296/1/S1600377_es.pdf (accessed 12 July 2019).
- Van Horne, J. and Wachowicz, J. (2010) *Fundamentos de Administración Financiera*, 13th ed., Pearson, Mexico City, Mexico, ISBN: 978-6-0744-2948-0.
- Véliz, C. (2017) *Análisis multivariante: métodos estadísticos multivariantes para la investigación*, Cengage Learning, Mexico, DF, Mexico, ISBN: 978-6-0732-0142-1.
- Welc, J. (2012) 'Company-size effect on the polish stock market', *Global Review of Accounting and Finance*, Vol. 3, No. 1, pp.53–66 [online] <https://ssrn.com/abstract=2051071> (accessed 15 July 2018).
- World Bank (2018a) *GDP Growth (Annual %) for the World (1999–2017)* [online] <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=1W&start=1999> (accessed 5 December 2018).
- World Bank (2018b) *GDP Growth (Annual %) for Peru (1999–2017)* [online] <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?end=2017&locations=PE&start=1999> (accessed 5 December 2018).
- Xie, Y. (2011) 'The market effects of breaking a string of meeting or beating analysts' expectations: downward revision of future cash flows or increase in cost of equity capital?', *Journal of Business Finance & Accounting*, Vol. 38, Nos. 1–2, pp.95–118, DOI [online] <https://doi.org/10.1111/j.1468-5957.2010.02225.x>.
- Yermack, D. (1996) 'Higher market valuation of companies with a small board of directors', *Journal of Financial Economics*, Vol. 40, No. 1996, pp.185–211, DOI [online] [https://doi.org/10.1016/0304-405X\(95\)00844-5](https://doi.org/10.1016/0304-405X(95)00844-5).
- Yin, Y., Peasnell, K. and Hunt, H.G. (2018) 'How do sell-side analysts obtain price-earnings multiples to value firms?', *Accounting and Business Research*, Vol. 48, No. 1, pp.108–135, DOI [online] <https://doi.org/10.1080/00014788.2016.1230486>.
- Yooyanyong, P.S., Suwanragasa, I. and Tangjitprom, N. (2020) 'The accuracy of various value drivers of price multiple method in determining equity price', *The Journal of Asian Finance, Economics and Business*, Vol. 7, No. 1, pp.29–36, DOI [online] <https://doi.org/10.13106/jafeb.2020.vol7.no1.29>.
- Zelazowski, K. (2015) 'Application of multiple-based methods in valuation of real estate development companies', *Real Estate Management and Valuation*, Vol. 23, No. 3, pp.26–35, DOI [online] <https://doi.org/10.1515/remav-2015-0022>.
- Zhong, H. (2016) 'An empirical study on the valuation of oil companies', *OPEC Energy Review*, Vol. 40, No. 1, pp.91–108, DOI [online] <https://doi.org/10.1109/ICSE.2015.101>.