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International Journal of Economic Policy in Emerging Economies

ISSN online: 1752-0460 - ISSN print: 1752-0452
https://www.inderscience.com/ijepee

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Pablo José Arana Barbier

DOI: 10.1504/IJEPEE.2022.10049624

Article History:
Received: 28 December 2021
Accepted: 25 June 2022
Published online: 27 July 2023

Towards a deeper comprehension of unlevered betas in emerging markets: Gordon and a regression stock valuation model

Pablo José Arana Barbier

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

Abstract: Unlevered betas determination in emerging markets remains a challenge because of the lack of formal tropicalised procedures. Replication of methods built for developed markets only generate biases. The study proposes a standardised procedure through the match of two asset pricing models in order to calculate unlevered betas more appropriately for a specific industry in an emerging market. The paper found that the model proposed permits a successful calculation of an unlevered beta which significantly correlates with the one estimated through the market line's slope without recurring to any preconceived indicators from developed markets. Also, the CAPM is reconfirmed as an appropriate opportunity cost for valuation, but dismisses inflation and country risk as part of its composition. Additionally, the paper identifies the main challenges among unlevered betas' calculation in emerging countries and proposes future research opportunities regarding this issue.

Keywords: asset pricing; capital asset pricing model; CAPM; emerging markets; levered betas; panel data multiple linear regression; perpetuity; stock valuation; stock valuation in emerging countries; unlevered betas; valuation models.

JEL codes: C23, C51, C58, G12.

Reference to this paper should be made as follows: Arana Barbier, P.J. (2023) 'Towards a deeper comprehension of unlevered betas in emerging markets: Gordon and a regression stock valuation model', *Int. J. Economic Policy in Emerging Economies*, Vol. 17, No. 4, pp.586–599.

Biographical notes: Pablo José Arana Barbier is a Doctor in Business Administration (DBA) and MBA from the Pontificia Universidad Católica del Perú (PUCP). He has Master's in Leadership from EADA Business School, Barcelona. He has a degree in Administration and International Business from the Universidad Peruana de Ciencias Aplicadas (UPC). He is a specialist in topics such as financial management, cost optimisation, corporate finance, project evaluation, logistics, and has more than 12 years of teaching experience. He has six peer reviewed articles published. He currently works as a Professor, researcher and the Director of the Master Program in Corporate Finance and Risk Management at CENTRUM PUCP Business School, Lima, Peru.

1 Introduction

Company valuation remains a current topic of discussion among academics (Miciuła et al., 2020). The variables on which it depends have been constantly rethought, and even though science has reached important findings regarding stock pricing, their valuation still represents a challenge in emerging countries (Bai and Green, 2020; Mayfield, 2004). Several aspects such as cash flow estimation (Kaplan and Ruback, 1995), the dividend scope through the Gordon model (Gordon, 1959), an appropriate opportunity cost (Ayub et al., 2020), the growth rate associated (Böni and Zimmermann, 2021), how liquid is the stock market in an emerging country (Jun et al., 2003), among other peculiarities, must be reconsidered to build a correct theoretical framework so that valuation theory can be adapted and successfully applied to stock pricing in emerging countries.

Availability of information is also a challenge, which is associated to the liquidity of a stock market (Festel et al., 2013). Nevertheless, although information could be accessible for financial analysts, it is also common that they prefer more practical pricing methods such as valuation multiples over discounted cash flow (DCF), even if those multiples offer less accurate results (Damodaran, 2005). It is true, though, that when financial analysts have a better academic and or professional preparation, they tend to use more sophisticated valuation instruments (Pinto et al., 2019). Nonetheless, in the case of emerging economies, stock valuation still tends to a mere direct application of financial theory regarding valuation as conceived for developed economies, instead or rethinking methods, variables and offering a customised process to find a more suitable way to explain stock prices in emerging markets. Vulnerability of emerging markets is even higher during pandemics, increasing those markets' uncertainty against developed ones (Salisu et al., 2020).

Probably, the main explanation for the young and ephemeral theory regarding stock valuation in emerging countries is that the lack of liquidity in those markets, combined with particularities along diverse locations, make defining a unique method of pricing stocks highly challenging (Bruner et al., 2002; Pereiro, 2006). Also, mixing variables is not only dangerous, but represents a strong bias as well. Since all the information used for the study will probably come from different sources, variables such as market premium and betas would be incongruous between themselves because of their composition, assuming for example that a rate free of risk will be obtained alone from one source, and the equity risk premium will be extracted from another (Shirvani et al., 2021). A way of fighting this issue is assuming standard variables such as the equity risk premiums drawn from Damodaran's (2021a) stock valuation initiative through Stern Business School. Although it is indeed practical, it does not solve the main problem, which is the lack of local standardisation valuation procedures for each emerging country whose stock market is object of study. Furthermore, there is a high chance that not only that premium, but the unlevered beta as well will not be the most suitable (Damodaran, 2021b; Pereiro, 2006, 2010), considering also that those betas from Stern Business School (Damodaran, 2021b) are different from the ones registered in Bloomberg, which at the same time are different from the ones calculated through the original capital asset pricing model (CAPM), or those observed in the market line's slope through the graphic method (Sharpe, 1964; Mossin, 1966), and distinct than those presented in this study.

It is well known that, besides an appropriately built free cash flow, an opportunity cost is needed to conduct a successful valuation. Even though this model has been widely

criticised among time, the CAPM remains a rigorous and well documented method to calculate an opportunity cost (Ayub et al., 2020; Krištofík, 2010; Sharpe, 1964). Nevertheless, among its elements, the beta is without a doubt the most sensible one of all (Rubinstein, 1973), but the betas available in databases such as Damodaran's (2005) initiative are not applicable to emerging countries (Bai and Green, 2020; Pereiro, 2006, 2010). Therefore, it is imperative that an applicable model to estimate betas for those countries be stated. Also, since markets appreciate the speed with which valuations are carried out, the proposed procedure should be fast and accurate at the same time. Thus, the study targets to propose an empirical view of the consolidation of several studies which will state a formal relation between the unlevered betas in order to reliably and easily calculate an unlevered beta for a company listed in the stock exchange of an emerging country.

The study is significant for five reasons. First, suitable information for beta calculation is not as easily found as in developed markets, which makes a procedure for beta estimation necessary. Second, implementing the CAPM requires an unlevered beta, which currently in emerging markets is being taken from the US betas, generating biases. Therefore, an objective tropicalised model to calculate unlevered betas is urgent. Third, the lack of liquidity in emerging countries, plus the small or null number of comparable firms, make the calculation of unlevered betas difficult. The study proposes a procedure with elements that can be used by any company no matter if they list publicly in a stock exchange or not. Furthermore, illiquidity restricts historical information needed for the estimation of the beta through the market line's slope, as well as for the non-listed companies, reason why listing publicly in an emerging market is not a guarantee for enough liquidity to reduce biases. The extrapolation of the studies' regression results will avoid users to depend on market information. Fourth, two important elements, specifically inflation and country risk, need to be tested at the CAPM level to define whether they really enhance the comprehension of unlevered betas. Fifth, the study contributes to the emerging markets company valuation literature, which is still incipient.

2 Literature review

According to Miciuła et al. (2020), stock valuation can be targeted for:

a internal

b external

c internal-external purposes whether the organisation pursues management, reporting or a potential reorganisation or sale, respectively.

What remains clear is that acknowledging a company's value is important for an appropriate decision-making, particularly for deal selection (Gompers et al., 2020). Among the most popular valuation methods, there are mainly two: DCF and valuation multiples, which are considered to be equally effective (Berkhman et al., 2000). Despite this, evidence show that financial analysts tend to use more the second ones (Damodaran, 2005), although they are carried out but not deeply understood regarding their full valuation potential (Bagna and Ramusino, 2017).

Whether DCF or valuation multiples are used for stock valuation, pricing companies in a developed country is considerably different than for a company in an emerging

market. This is not only based on the fact that different valuation multiples are used for developed and emerging markets (Akhtar, 2021), but also on the several challenges that asset pricing in emerging countries represent. According to Bruner et al. (2002), valuing assets in emerging countries involve fighting against:

a the information environment

b corruption and control

c the influence of predefined portfolios over the investors' decisions

d mimicry between investors' behaviour

e the lack of meaning of the correlation between returns and the downside beta

f inflation and devaluation, and therefore it is highly challenging.

In fact, the relativeness of the previous factors is also sustained by other authors who proposed that, for emerging countries, country risk strongly influences valuation (Pereiro, 2010), investor sentiment has a strong effect over stock returns (Liu, 2015; Zaremba et al., 2020), and market news are important stock return drivers (Al-Maadid et al., 2020).

Combining both the complexity of stock valuation in emerging countries and valuation multiples, authors have also proposed specific models to apply those multiples to emerging countries. Gupta (2018) stated a model considering:

a earnings

b sales

c enterprise value

d earnings before interests, taxes, depreciation and amortisation (EBITDA).

Arana and Burneo (2021) proposed a model containing:

a earnings per share (EPS)

b cost efficiency (CE)

c commodity related businesses (COMM).

Both models point to reach a stock price for emerging countries. The second one considered also a delimitation regarding liquidity or negotiation frequency, since it has also been identified as a relevant issue regarding stock valuation in emerging economies. They have been classified as non-liquid markets (Festel et al., 2013), situation that needs to be considered for valuation since stock returns in those environments correlate positively with liquidity levels. Nevertheless, illiquidity is expected to be a recurrent problem, since more records for analysis would involve studying several industries as a whole, when each industry has its own market behaviour and should be studied separately (Alford, 1992). Furthermore, there is not currently a valid illiquidity premium that could be used for frontier markets (Stereńczak et al., 2020), while it is a fact that daily data offers a smaller beta standard deviation than monthly data (Pham and Phuoc, 2020). This assertion makes the problem remain to date since stock negotiation in emerging markets does not happen daily, with much longer timeframes between transactions.

The way in which financial analysts in emerging countries approach stock valuation is questionable. They replicate investment strategies from other investors, even at the expense of better returns if other strategies were used instead (Bruner et al., 2002). Furthermore, they use:

a net present value (NPV)

b internal rate of return (IRR)

c discounted payback period (DPP)

d CAPM in US dollars as if the companies analysed were from the USA, plus they use US betas for their valuations, generating biases (Pereiro, 2006).

Defining an appropriate beta is difficult though, since there is a strong beta dilemma for emerging economies because of the non-applicability of the original Sharpe (1964) model, plus the lack of comparable firms inside their small stock exchange markets from which to derive the beta (Pereiro, 2010).

A suitable model for stock valuation in emerging markets is the Gordon (1959) model through:

a dividend payment

b CAPM

c growth rate (Böni and Zimmermann, 2021).

Dividends are considered highly relevant for stock valuation (DeAngelo and DeAngelo, 2006) and negotiation promoters for their correlation with stock volatility (Pelcher, 2019), in spite of Modigliani and Miller's original considerations about dividends (Modigliani and Miller, 1958, 1963), although there is evidence about the apparent irrelevance of dividend payments, regardless of the amount paid, over the price of a stock (Arana and Burneo, 2021). The growth rate can be estimated through reinvestment dividend policies and return on equity (ROE) (Böni and Zimmermann, 2021) or through the average behaviour of the industry's profitability (Corbey et al., 2019). The main inconvenient with the Gordon (1959) model applied to emerging countries is the CAPM because of the complications of that application to companies in partially integrated markets, which need the inclusion of local particularities to fine-tune the opportunity cost (Bai and Green, 2020). Even though the equity risk premium is also challenging (Mayfield, 2004; Shirvani et al., 2021), the beta remains a strong inconvenient whether it is calculated through the market line's slope (Mossin, 1966), levered (Hamada, 1972; Rubinstein, 1973), simply replicated from Damodaran's initiative (Pereiro, 2006, 2010), or complemented through more extended model such as the six element CAPM (Ayub et al., 2020).

3 Method

The main objective of the study is to propose a procedure through which an unlevered beta can be calculated for companies in emerging countries. Among the valuation methods available and compatible with those markets, valuation multiples through Arana and Burneo (2021)'s panel data multiple linear regression offer parsimony with fewer

variables and worry about additional control dummy variables over Gupta (2018)'s model. Also, Gordon (1959)'s model is useful for approximating to a stock's price through dividend payments as the estimated cash flows for stockholders, growth rate can be estimated (Corbey et al., 2019), and the CAPM associated as the opportunity cost contains the unlevered beta object of study, although additional elements such as inflation and country risk need to be considered (Pereiro, 2010). Therefore, both models were matched to find the beta in question, plus a comparison of the betas obtained is offered between the results with and without inflation and country risk included.

The study aims to understand the behaviour of the unlevered betas in the Lima Stock Exchange in Peru, specifically the industrial sector, which is composed by 30 companies that effectively have a ticker assigned. Nevertheless, aligned with the fact that the model proposed involves dividend payments (Böni and Zimmermann, 2021; Gordon, 1959), the number was reduced to 28 firms. Finally, according to the importance of liquidity (Stereńczak et al., 2020) understood as negotiation frequency, a total of 19 firms evidenced erratic negotiation, understood as periods of four months or more without any operation registered, which made the stock price remain the same for several months (Bruner et al., 2002; Festel et al., 2013; Pereiro, 2006). This last delimitation left nine firms remaining. A five-year horizon of data was considered from 2016 to 2020, generating a total of 28 records of information. The financial information used in the study was retrieved from Bloomberg.

The two main research questions are the following:

Question 1 What is the correlation level between the unlevered beta found through the match of Gordon (1959) and Arana and Burneo (2021) models and the unlevered beta obtained through Sharpe's (1964) market line's slope?

Question 2 Is the determination coefficient (R^2) of the multiple linear regression that includes inflation and country risk inside the CAPM higher than the determination coefficient (R^2) of the multiple linear regression that does not include inflation and country risk inside the CAPM?

4 Data analysis

The model stated by Arana and Burneo (2021) involves the correlation of three financial multiples:

a CE, calculated as cost of sales over assets

b EPS, calculated as net profit over total of shares outstanding

c COMM, a dummy variable defined with one if the main business line involves commodities as raw materials, and zero if it does not.

The three multiples considered correspond to company *i* in year *j*, plus the constant *c*. The regression expression is shown as equation (1). It is important to specify that for every element in the following formulas, year j represents a single year between 2016 and 2020.

$$y = c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij} \quad (1)$$

Gordon (1959) proposed a dividend discount model, which is shown as equation (2). The dividend payment corresponds to the EPS of company *i* in year *j*, times *b*, which stands for the fraction of earnings reinvested of company *i* in year *j* (Böni and Zimmermann, 2021). An important element of this specific valuation model is the opportunity cost noted as *k*, which corresponds to the CAPM of company *i* in year *j*. The growth rate *w* stands for the average growth of the industry's yield from 2016 to 2020 (Corbey et al., 2019).

$$\frac{D_{ij}}{k_{ij}-w}=\frac{EPS_{ij}\left(1-b_{ij}\right)}{k_{ij}-w} \tag{2}$$

The CAPM used obeys to the original Sharpe's (1964) model, shown as equation (3). Nevertheless, in order to follow Roggi et al.'s (2016) findings, the CAPM will also be tested as stated in equation (4), including inflation and country risk (Pereiro, 2010). R_E represents the CAPM as the investor's opportunity cost for company *i* in year *j*. R_F stands for the average 10-year US treasury bond yield during the five-year period of 2016 to 2020 (Market Watch, 2021; Rafique et al., 2019). The corresponding levered beta (β_L) stands for the correlation coefficient of the market's yield versus the company's yield for company *i* in year *j*. RM represents the annual average industry yield from 2016 to 2020 (S&P Dow Jones Indices, 2021a). Inflation (π) represents the average inflation of Peru from 2016 to 2020 (World Bank, 2021). Finally, country risk (RP) is calculated as the average difference between the 10-year Peruvian and the 10-year US treasury bonds yield from 2016 to 2020 (Market Watch, 2021; Pereiro, 2010; S&P Dow Jones Indices, 2021b).

$$R_{E_{ij}}=R_F+\beta_{L_{ij}}\left(R_M-R_F\right) \tag{3}$$

$$R_{E_{ij}}=R_F+\beta_{L_{ij}}\left(R_M-R_F\right)+\pi+R_P \tag{4}$$

For each year analysed, for each company involved, a unique CAPM was calculated. The beta included in the formula corresponded to the levered one, reason why an unlevered beta was needed. The Hamada equation (Hamada, 1972) used for unlevering purposes is stated as equation (5). The unlevered beta (β_U) stands for the correlation coefficient of the market's yield versus the company's yield for company *i* in year *j* unlevered through the Hamada equation considering the financial debt (*D*) and the total equity (*E*) of company *i* in year *j*.

$$\beta_{L_{ij}}=\beta_{U_{ij}}\left[1+\frac{D_{ij}}{E_{ij}}(1-T)\right] \tag{5}$$

Since Arana and Burneo (2021) and Gordon (1959) models target to calculate the price of the stock, both expressions were matched, as stated in equation (6).

$$c+x_1CE_{ij}+x_2EPS_{ij}+x_3COMM_{ij}=\frac{EPS_{ij}\left(1-b_{ij}\right)}{k_{ij}-w} \tag{6}$$

As a result of replacing *k* with the whole CAPM expression, the equation obtained is shown in equation (7).

$$c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij} = \frac{EPS_{ij}\left(1 - b_{ij}\right)}{\left[R_F + \beta_{L_{ij}}\left(R_M - R_F\right) + \pi + R_P\right] - w} \tag{7}$$

In order to reach the equation needed expressed in terms of the unlevered beta, four additional steps were required. First, Arana and Burneo (2021) model exchanged positions with the CAPM [equation (8)]. Second, inflation, country risk and growth rate changed sides leaving the levered beta times the equity risk premium remaining [equation (9)]. Third, the equity risk premium passed to the right of the equation, leaving the levered beta alone [equation (10)]. Fourth, the whole expression was unlevered through the Hamada equation, where the unlevered beta (β_U) corresponds to company *i* in year *j* [equation (11)]. The same expressions without inflation and country risk are shown as equations (12) and (13).

$$\left[R_F + \beta_{L_{ij}}\left(R_M - R_F\right)\right] + \pi + R_P - w = \frac{EPS_{ij}\left(1 - b_{ij}\right)}{c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij}} \tag{8}$$

$$\beta_{L_{ij}}\left(R_M - R_F\right) = \frac{EPS_{ij}\left(1 - b_{ij}\right)}{c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij}} - \pi + R_P + w - R_F \tag{9}$$

$$\beta_{L_{ij}} = \left[\frac{\dfrac{EPS_{ij}\left(1 - b_{ij}\right)}{c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij}} - \pi - R_P + w - R_F}{\dfrac{\left(R_M - R_F\right)}{1}}\right] \tag{10}$$

$$\beta_{U_{ij}} = \frac{\left[\dfrac{\dfrac{EPS_{ij}\left(1 - b_{ij}\right)}{c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij}} - \pi - R_P + w - R_F}{\dfrac{\left(R_M - R_F\right)}{1}}\right]}{\left[1 + \dfrac{D_{ij}}{E_{ij}}(1 - T)\right]} \tag{11}$$

$$\beta_{L_{ij}} = \left[\frac{\dfrac{EPS_{ij}\left(1 - b_{ij}\right)}{c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij}} + w - R_F}{\dfrac{\left(R_M - R_F\right)}{1}}\right] \tag{12}$$

$$\beta_{U_{ij}} = \frac{\left[\dfrac{\dfrac{EPS_{ij}\left(1 - b_{ij}\right)}{c + x_1 CE_{ij} + x_2 EPS_{ij} + x_3 COMM_{ij}} - + w - R_F}{\dfrac{\left(R_M - R_F\right)}{1}}\right]}{\left[1 + \dfrac{D_{ij}}{E_{ij}}(1 - T)\right]} \tag{13}$$

The levered and unlevered betas calculated for each company for each year were compared to the levered and unlevered betas obtained through the graphic method, which involve the expressions shown in equations (14) and (15) (Mossin, 1966; Sharpe, 1964).

$$\beta_{L_{ij}} = \frac{\operatorname{cov}\left(R_M, R_{E_{ij}}\right)}{\sigma_{R_M}\sigma_{R_{E_{ij}}}} \tag{14}$$

$$\beta_{U_{ij}} = \frac{\dfrac{\operatorname{cov}\left(R_M, R_{E_{ij}}\right)}{\sigma_{R_M}\sigma_{R_{E_{ij}}}}}{\left[1+\dfrac{D_{ij}}{E_{ij}}(1-T)\right]} \tag{15}$$

5 Results

The data was processed first through the Arana and Burneo (2021) model, which offered the regression needed for the price estimation for each stock, as proposed by equation (1). The adjusted R^2 obtained was 0.6553, with the coefficients shown in Table 1. Although the distribution of coefficients is different than the one obtained in the original paper, it is indeed relevant to identify how relevant the EPS is for companies that paid dividends, considering that the time horizon analysed only includes those years in which the studied companies paid dividends to the stockholders. When regressing only EPS against the price, an adjusted R^2 of 0.9593 was obtained. Nevertheless, the model was maintained for methodological purposes, since a new model would require additional validations and proposing a new one is not the object of the current study.

Table 1 Regression according to equation (1)

	Coefficient	*Standard error*	*p-value*
Intercept	0.903	2.482	0.719
Cost efficiency (CE)	–2.423	2.006	0.239
Earnings per share (EPS)	20.076	4.377	0.000***
Commodity related business (COMM)	0.448	1.595	0.781

Note: *** Significant at a 99% confidence level.

Once the prices were calculated for each company for each year, equations (10) and (11) were used to obtain the levered and unlevered betas through the match of Arana and Burneo's (2021) and Gordon's (1959) models. These results are shown in Tables 2 and 3 with adjusted R^2s of 0.1271 and 0.2727, respectively. Tables 4 and 5 shows the same procedures but without considering inflation and country risk through equations (12) and (13), with adjusted R^2s of 0.1271 and 0.3382, respectively.

Regarding the research questions, the correlation level between the unlevered beta found through the match of Gordon (1959) and Arana and Burneo (2021) models and the unlevered beta obtained through Sharpe's (1964) market line's slope obeys to an adjusted R^2 of 2727, and it increases to 0.3382 when inflation and country risk are not included in the CAPM. Therefore, it cannot be said that the incorporation of those factors enhances the correlation, but the evidence points to the opposite effect.

Table 2 Regression of levered betas through equation (10) (dependent) and equation (14) (independent) considering inflation and country risk

	Coefficient	*Standard error*	*p-value*
Intercept	–0.887	0.170	0.000***
β_L (graphic method)	0.354	0.159	0.035**

Notes: **Significant at a 95% confidence level.
***Significant at a 99% confidence level.

Table 3 Regression of unlevered betas through equation (11) (dependent) and equation (15) (independent) considering inflation and country risk

	Coefficient	*Standard error*	*p-value*
Intercept	–0.606	0.102	0.000***
β_L (graphic method)	0.394	0.118	0.003***

Note: ***Significant at a 99% confidence level.

Table 4 Regression of levered betas through equation (12) (dependent) and equation (14) (independent) without considering inflation and country risk

	Coefficient	*Standard error*	*p-value*
Intercept	0.946	0.170	0.000***
β_L (graphic method)	0.354	0.159	0.035**

Notes: **Significant at a 95% confidence level.
***Significant at a 99% confidence level.

Table 5 Regression of unlevered betas through equation (13) (dependent) and equation (15) (independent) without considering inflation and country risk

	Coefficient	*Standard error*	*p-value*
Intercept	0.567	0.121	0.000***
β_L (graphic method)	0.536	0.139	0.001***

Note: ***Significant at a 99% confidence level.

Asset pricing in emerging countries, particularly stock valuation, remains challenging (Bai and Green, 2020; Bruner et al., 2002; Mayfield, 2004; Pereiro, 2006). The results shown above reveal three relevant points in this regard. First, the opportunity cost, specifically the CAPM, was expected to be enhanced through the inclusion of inflation and country risk. It is true that the model was useful for the study, which is coherent with the idea that it remains strong among time (Ayub et al., 2020; Krištofík, 2010). Nevertheless, even though the Peruvian market studied qualifies as an emerging one, inflation and country risk did not let the study obtain more determinant results regarding the unlevered beta, in spite of the related literature (Pereiro, 2010). Even though they cannot be discarded completely, the results set an important precedent regarding the contribution of these factors to stock valuation as not the most appropriate local particularities to fine-tune the opportunity cost in partially integrated markets (Bai and Green, 2020).

Second, illiquidity is a strong constraint and it indeed limits considerably the analysis towards obtaining an unlevered beta (Jun et al., 2003; Stereńczak et al., 2020). The study

started targeting 30 companies, but mainly because the majority of them did not show a consistent stock negotiation volume, they were discarded, leaving only nine companies left. Particularly in the case of Peru, the only way to extend the number of companies studied, and consequently the number of information records, would be to consider other industries from the same stock market. Nevertheless, the market return inside the CAPM refers specifically to the industries' yield (Sharpe, 1964), and it would be inappropriate to combine different industries in the same study because of its different characteristics (Alford, 1992), and therefore its own and unique unlevered betas. Thus, when an unlevered beta is needed for a specific industry from the Peruvian stock market, it will be inevitable to work with few information records. In addition to liquidity restrictions, financial information in emerging markets has been systematically restricted, not only through the official authorities' websites, but through structured databases such as Economatica (Arana and Burneo, 2021) and Bloomberg.

Third, although dividends are highly relevant for stock valuation (DeAngelo and DeAngelo, 2006) and are the core element inside Gordon's model (Gordon, 1959), this does not necessarily comply for emerging markets. There is evidence about how EPS is more relevant than the dividend itself, regardless of whether earnings ended up becoming dividend payments or not (Arana and Burneo, 2021). This offers evidence of what could represent a highly speculative environment, where dividend payment is not relevant because earnings are generated through short term price differentials (Morck et al., 2000). The previous situation is also sustained through the importance of investor sentiment in emerging stock markets and how it can influence pricing and earnings (Liu, 2015; Zaremba et al., 2020).

6 Final considerations

Valuation methods from developed markets cannot be replicated in emerging ones without a proper topicalization. Notwithstanding, this effort does not guarantee an appropriate procedure. Obstacles such as opportunity cost, negotiation liquidity, availability of information, dividend payments, volatility and investor sentiment have an impact on asset pricing, making it a real challenge to determine an unlevered beta for a specific industry in an emerging market.

An empirical approximation to unlevered betas through Arana and Burneo (2021) and Gordon (1959) is useful for any company to understand its unlevered beta through elements that can be easily retrieved from publicly available databases, plus the financial information of that company. Nevertheless, future research is needed to understand the specific factors that would explain the remaining correlation of unlevered betas calculated through the graphic method against those calculated through this paper's proposed method, since the adjusted R^2 obtained is 0.3382.

Finally, EPS and investor sentiment seem to be, according to this study's findings and the literature review involved, the potential explanatory factors of unlevered betas in emerging countries. It is reasonable that EPS has not been considered before since Gordon's (1959) model considers dividends, not just earnings. Nonetheless, if emerging markets value more speculation and price differentials, then EPS would become a critical factor, even more relevant than dividend payment itself.

References

Akhtar, T. (2021) 'Market multiples and stock returns among emerging and developed financial markets', *Borsa Istanbul Review*, Vol. 21, No. 1, pp.44–56, https://doi.org/10.1016/j.bir.2020.07.001.

Alford, A. (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.

Al-Maadid, A., Caporale, G.M., Spagnolo, F. and Spagnolo, N. (2020) 'The impact of business and political news on the GCC stock markets', *Research in International Business and Finance*, Vol. 52, p.101102, https://doi.org/10.1016/j.ribaf.2019.101102.

Arana, P.J. and Burneo, K.J. (2021) 'Emerging market stock valuation: new evidence from Peru', *International Journal of Economic Policy in Emerging Economies*, Vol. 14, No. 1, pp.39–65, https://doi.org/10.1504/IJEPEE.2021.111949.

Ayub, U., Kausar, S., Noreen, U., Zakaria, M. and Jadoon, I.A. (2020) 'Downside risk-based six-factor capital asset pricing model (CAPM): a new paradigm in asset pricing', *Sustainability*, Vol. 12, No. 17, pp.1–16, https://doi.org/10.3390/SU12176756.

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, https://doi.org/10.5539/ibr.v10n12p246.

Bai, Y. and Green, C.J. (2020) 'Country and industry factors in tests of capital asset pricing models for partially integrated emerging markets', *Economic Modelling*, Vol. 92, pp.180–194, https://doi.org/10.1016/j.econmod.2019.12.019.

Berkhman, H., Bradbury, M.E. and Ferguson, J. (2000) 'The accuracy of price-earning and discounted cash flow methods of IPO equity valuation', *Journal of International Financial Management and Accounting*, Vol. 11, No. 2, pp.71–83.

Böni, P. and Zimmermann, H. (2021) 'Are stock prices driven by expected growth rate rather than discount rates? Evidence based on the COVID-19 crisis', *Risk Management*, Vol. 23, No. 1, pp.1–29, https://doi.org/10.1057/s41283-021-00070-x.

Bruner, R.F., Conroy, R.M., Estrada, J. and Kritzman, M. (2002) 'Introduction to 'valuation in emerging markets', *Emerging Markets Review*, Vol. 3, No. 4, pp.310–324, https://doi.org/10.1016/S1566-0141(02)00039-0.

Corbey, M., de Roon, F. and Hinfelaar, S. (2019) 'Company life cycle models and business valuation', *Maandblad Voor Accountancy en Bedrijfseconomie*, Vol. 93, Nos. 9/10, pp.285–296, https://doi.org/10.5117/mab.93.37561.

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, https://doi.org/10.1561/0500000013.

Damodaran, A. (2021a) *Country Default Spreads and Risk Premiums* [online] http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctryprem.html (accessed 28th April 2021).

Damodaran, A. (2021b) *Betas by Sector* [online] http://people.stern.nyu.edu/adamodar/New_Home_Page/dataarchived.html#region (accessed 28th April 2021).

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, https://doi.org/10.1016/j.jfineco.2005.03.003.

Festel, G., Wurmseher, M. and Cattaneo, G. (2013) 'Valuation of early-stage companies', *International Journal of Business*, Vol. 18, No. 3, pp.216–231.

Gompers, P., Gornall, W., Kaplan, S.N. and Strebulaev, I.A. (2020) 'How do venture capitalists make decisions?', *Journal of Financial Economics*, Vol. 135, No. 1, pp.169–190, https://doi.org/10.1016/j.jfineco.2019.06.011.

Gordon, M.J. (1959) 'Dividends, earnings, and stock prices', *Review of Economics and Statistics*, Vol. 41, No. 2, pp.99–105 [online] http://www.jstor.org/stable/1927792 (accessed 24th February 2021).

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, https://doi.org/10.4236/tel.2018.85052.

Hamada, R.S. (1972) 'The effects of the firm's capital structure on the systematic risk of common stocks', *The Journal of Finance*, Vol. 27, No. 2, pp.435–452, https://doi.org/10.2307/1910098.

Jun, S., Marathe, A. and Shawky, H. (2003) 'Liquidity and stock returns in emerging equity markets', *Emerging Markets Review*, Vol. 4, No. 1, pp.1–24, https://doi.org/10.1016/S1566-0141(02)00060-2.

Kaplan, S. and Ruback, R. (1995) 'The valuation of cash flow forecasts: an empirical analysis', *The Journal of Finance*, Vol. 50, No. 4, pp.1059–1093, https://doi.org/10.1111/j.1540-6261.1995.tb04050.x.

Krištofík, P. (2010) 'Application of CAPM for investment decisions in emerging countries', *Managing and Modelling of Financial Risks*, Vol. 7, No. 1, pp.203–209.

Liu, S. (2015) 'Investor sentiment and stock market liquidity', *Journal of Behavioral Finance*, Vol. 16, No. 1, pp.51–67, https://doi.org/10.1080/15427560.2015.1000334.

Market Watch (2021) *U.S. 10 Year Treasury Note* [online] https://www.marketwatch.com/investing/bond/tmubmusd10y?countrycode=bx (accessed 28th April 2021).

Mayfield, E. (2004) 'Estimating the market risk premium', *Journal of Financial Economics*, Vol. 73, No. 3, pp.465–496, https://doi.org/10.1016/j.jfineco.2002.03.001.

Miciuła, I., Kadłubek, M. and Stępień, P. (2020) 'Modern methods of business valuation—case study and new concepts', *Sustainability*, Vol. 12, No. 7, p.2699, https://doi.org/10.3390/su12072699.

Modigliani, F. and Miller, M.H. (1958) 'The cost of capital, corporation finance and the theory of investment', *The American Economic Review*, Vol. 48, No. 3, pp.261–297.

Modigliani, F. and Miller, M.H. (1963) 'Corporate income taxes and the cost of capital: a correction', *The American Economic Review*, Vol. 53, No. 3, pp.433–443, https://doi.org/10.2307/1809167.

Morck, R., Yeung, B. and Yu, W. (2000) 'The information content of stock markets: why do emerging markets have synchronous stock price movements?', *Journal of Financial Economics*, Vol. 58, Nos. 1–2, pp.215–260, https://doi.org/10.1016/S0304-405X(00)00071-4.

Mossin, J. (1966) 'Equilibrium in a capital asset market', *Econometrica*, Vol. 34, No. 4, pp.768–783, https://doi.org/10.2307/1910098.

Pelcher, L. (2019) 'The role of dividend policy in share price volatility', *Journal of Economic and Financial Sciences*, Vol. 12, No. 1, pp.1–10, https://doi.org/10.4102/jef.v12i1.221.

Pereiro, L. (2010) 'The beta dilemma in emerging markets', *Journal of Applied Corporate Finance*, Vol. 22, No. 4, pp.110–122, https://doi.org/10.1111/j.1745-6622.2010.00307.x.

Pereiro, L.E. (2006) 'The practice of investment valuation in emerging markets: evidence from Argentina', *Journal of Multinational Financial Management*, Vol. 16, No. 2, pp.160–183, https://doi.org/10.1016/j.mulfin.2005.06.001.

Pham, C.D. and Phuoc, L.T. (2020) 'Is estimating the capital asset pricing model using monthly and short-horizon data a good choice?', *Heliyon*, Vol. 6, No. 7, p.e04339, https://doi.org/10.1016/j.heliyon.2020.e04339.

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, https://doi.org/10.1002/rfe.1040.

Rafique, A., Iqbal, K., Zakaria, M. and Mujtaba, G. (2019) 'Investigating ICAPM with mean-reverting dynamic conditional correlation: Evidence from an emerging stock exchange', *Physica A: Statistical Mechanics and its Applications*, Vol. 525, pp.514–523, https://doi.org/10.1016/j.physa.2019.03.055.

Roggi, O., Giannozzi, A. and Baglioni, T. (2016) 'Firm valuation in emerging markets and the exposure to country risk', *Global Journal of Management and Business Research*, Vol. 16, No. 1, pp.1–19.

Rubinstein, M.E. (1973) 'A mean-variance synthesis of corporate financial theory', *The Journal of Finance*, Vol. 28, No. 1, pp.167–181, https://doi.org/10.2307/2978179.

S&P Dow Jones Indices (2021a) *S&P/BVL Industrials Index* [online] https://www.spglobal.com/spdji/en/indices/equity/sp-bvl-industrials-index/#overview (accessed 28th April 2021).

S&P Dow Jones Indices (2021b) *S&P Peru Sovereign Bond Index* [online] https://espanol.spindices.com/indices/fixed-income/sp-peru-sovereign-bond-index (accessed 28th April 2021).

Salisu, A., Sikiru, A. and Vo, X. (2020) 'Pandemics and the emerging stock markets', *Borsa Istanbul Review*, Vol. 20, pp.40–48, https://doi.org/10.1016/j.bir.2020.11.004.

Sharpe, W. (1964) 'Capital asset prices: a theory of market equilibrium under conditions of risk', *The Journal of Finance*, Vol. 19, No. 3, pp.425–442, https://doi.org/10.1111/j.1540-6261.1964.tb02865.x.

Shirvani, A., Stoyanov, S.V., Fabozzi, F.J. and Rachev, S.T. (2021) 'Equity premium puzzle or faulty economic modelling?', *Review of Quantitative Finance and Accounting*, Vol. 56, No. 4, pp.1329–1342, https://doi.org/10.1007/s11156-020-00928-3.

Stereńczak, S., Zaremba, A. and Umar, Z. (2020) 'Is there an illiquidity premium in frontier markets?', *Emerging Markets Review*, Vol. 42, p.100673, https://doi.org/10.1016/j.ememar.2019.100673.

World Bank (2021) *Inflation, GDP deflator (annual %) – Peru* [online] https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG?locations=PE (accessed 28th April 2021).

Zaremba, A., Szyszka, A., Long, H. and Zawadka, D. (2020) 'Business sentiment and the cross-section of global equity returns', *Pacific-Basin Finance Journal*, June, Vol. 61, p.101329, https://doi.org/10.1016/j.pacfin.2020.101329.