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Fundamental factors and the level of underpricing

ABSTRACT

Underpricing has been the subject of substantial research at a global scale and has been thoroughly described in the literature, but it is still unclear what factors influence its level in the Polish capital market, particularly in the context of fundamental factors. Since investors have very limited information of the companies going public, the companies must convey or signal information that can be used for valuing their shares. The aim of the article is to identify the impact of a company's fundamental factors on the level of underpricing of an initial public offering. The research is based on the sample of 227 companies debuting in the regulated market of the Warsaw Stock Exchange between 2005 and 2022. The empirical analysis and regression results estimation were based on the data coming from prospectuses of the companies going public. To prepare the econometric linear regression model, the stepwise forward variable selection procedure was carried out. The evidence indicates that underpricing is significantly affected by a few financial variables, such as assets, ROA, BVS, and EPS.

Keywords: initial public offering (IPO), underpricing, fundamental factors, valuation

JEL Classification: G12, G14, G32

Introduction

Various factors have been analyzed in terms of their impact on underpricing. Therefore, many theories have developed to explain this phenomenon. The flourishing interest of researchers in underpricing of initial public offerings has led to developing models to explain its determinants. Numerous concepts with different backgrounds and theoretical justifications have emerged, offering competing theories to explain the returns of IPOs. Empirical verification of the proposed theories depends on the time of the study and the market under study, and the results vary. As a result, various classifications of theories were shaped, among which it is worth pointing out studies of Ibbotson and Ritter [1995], Ritter [2003], Ljungqvist [2007], Ritter and Welch [2002], Jones and Yeoman [2018]. Factors related to information asymmetry, behavioural aspects, institutional causes, and ownership and control are studied. These factors relate to the characteristics of the market, the characteristics of the company, as well as the characteristics of the offering itself.

Although underpricing has been the subject of substantial research at a global scale and has been thoroughly described in the literature, it is still unclear what determinants influence its level in the Polish capital market. The IPO underpricing phenomenon and its determinants in the Polish stock market are relatively little researched. Most of the research is concentrated on market specific factors or characteristic of the offer. Investors have very limited information on new issue companies and so the firms have to convey or signal information that can be used for valuing their shares. There is little research concerning firm specific factors [Brycz et al., 2017; Lizińska, Czapiewski, 2015; Małachowski, Gadowska-dos Santos, 2021; Mizerka, Lizińska, 2017, Sukacz, 2005; Zarzecki, Wołoszyn, 2016]. Some of the different fundamental factors have already been studied in that research, while the importance of others has yet to be proven. The aim of the article is to identify how fundamental factors influence the level of underpricing of an initial public offering (IPO). The study is based on the example of 227 companies debuting in the main market of the Warsaw Stock Exchange (WSE) between 2005 and 2022. The data were manually collected and they came from prospectuses of the debuted companies and from the official webpage of the Warsaw Stock Exchange. Consequently, a linear model was estimated for variables selected by a stepwise forward selection procedure and with underpricing as a dependent variable.

The rest of the paper is organized as follows. Section 2 contains main aspects of valuation in the context of IPO and establishing the allocation price. In section 3 financial factors in valuation of shares are presented. Section 4 is devoted to the review of the literature on the determinants of underpricing. The research method and data selection are included in Section 5. Results of the research are shown in Section 6. The last section contains conclusions.

Valuation of the company and IPO share allocation price

An important part of taking a company public is determining the price at which investors are allotted shares in the offering. The mechanism of setting the price of shares in an initial public offering is based on a valuation which in this process, although based on methods known in theory and practice, is very specific. Firstly, it is due to the difficulties caused by the lack of widely available previous analytical valuation reports and the lack of market prices to observe. Secondly, it is multi-phase in nature, as the company's valuation is revised and updated during various phases of the process as experience is gained. The difficulties of this process arise primarily from the divergence of interests of the stakeholders of a given company. Such a condition forces the development of a compromise between the conflicting expectations of these different groups. In some of the earliest work on underpricing, Bear and Curley [1975] noted that in determining the premiums associated with the issuance of new shares, underwriters must work with three sets of prices, e.g. the expected first price in the secondary market, the offering price set by the underwriter, and the price of the net proceeds to be paid to the company.

During the offering process, a preliminary price range is given, and then, after road shows, the final offering price is determined. The most common approach for determining the price of shares offered in an IPO have taken shape in practice [Chemmanur, Liu, 2019; Sherman, 2005], and they are as follows:

- a fixed price, which is set in advance by the issuer in conjunction with the underwriter and is usually given already in the offering document (prospectus or annex to the prospectus). It is a uniform price applicable to investors, who, based on it, declare their demand by making an offer to purchase a certain number of shares. If there is an excess of demand over supply, there is a reduction of bids, which is carried out in accordance with the procedure described in the offering document;
- the price determined as a result of the auction and set on the basis of the submitted bids to purchase a certain number of shares, which will enable the entire offering to be sold. In the case of oversubscription, the reduction applies to bids submitted by investors who offered lower prices than the final bid price. In the so-called discriminatory auction, the prices for investors are different, so everyone pays the price they negotiated. In uniform auctions, on the other hand, the share price is set as a result of the auction uniform for all investors, but the price submitted by investors cannot be lower than the price predetermined by the issuer;
- the price determined on the basis of the bookbuilding mechanism, which involves the creation of a list of investors declaring their intention to subscribe for shares, including the number of shares along with a suggested price. This non-binding activity is carried out prior to the start of the public subscription in order to preliminarily identify potential demand for shares from particular groups of investors, which means that investors are under no obligation to purchase the shares.

Regardless of the method adopted for determining the allotment price, it is determined by the issuer in cooperation with the underwriter. Kim and Ritter's [1999] research confirmed an added value of investment banks in pricing issues. Firstly, they can perform a professional fundamental analysis. Secondly, they are able to study market demand before setting the final offering price.

Chemmanur and Krishnan [2012] found that equity in high-reputation underwriter backed IPOs is priced higher and further away from their intrinsic value than those in low-reputation underwriter backed IPOs. Their results support the market power hypothesis and reject the certification hypothesis, indicating that the role of underwriters is to obtain the highest possible valuation for the IPOs that they back rather than to price the equity close to its intrinsic value.

Kim and Ritter [1999] used accounting information and multipliers of comparable companies as benchmarks in selecting an initial offering price range, the additional information they process on market demand results in a much more accurate offering price. Therefore, their results suggest that the pricing precision would be much worse if a mechanical algorithm was used instead. Kim and Ritter [1999] found that valuing IPOs using comparable firm multipliers (e.g. the price-to-earnings, price-to-sales, enterprise value-to-sales, and enterprise value-to-operating cash flow ratios of comparable firms) is of only limited use if historical numbers rather than forecasts are used. This is largely due to the wide variety of these indicators for young companies in a given industry, but also because many idiosyncratic factors are not accounted for in industry multipliers, so various adjustments are applied, usually in the 10%–20% range, to reflect differences in growth rates, profitability, and other figures. According to Boulton et al. [2017], this also suggests that cross-country differences in IPO valuations could be influenced by differences in multiples across markets.

Some authors stressed that the categories of valuation and price are closely related but the distinction between them is needed. It is particularly important in light of the specific valuation of shares in the IPO process. Jaki [2004, p. 24] indicated that the value of an enterprise is the basis for determining its price. Furthermore, the price is the process of negotiation conducted by interested parties to conclude a sale and purchase transaction, and its determination is usually the result of a compromise between the subjective values proposed by the parties involved. According to Kasiewicz and Mączyńska [1999], the price for a company is not its valuation, and the result is just an indication of what the company's price might be. They reported that price as an economic category is the result of such basic factors as the relationship of demand and supply, the clash of decisions and price proposals of the seller and buyers, and the strategies adopted by them. Zarzecki [1998, p. 33] points out that the market value at any point in time can be the result of both the preferences and even the whims of the committed parties, as well as the prevailing market sentiment, economic fluctuations, the political situation, etc., and stresses that the true market value can only be determined by the actual involvement in a buy-sell transaction. Ritchie [1997, p. 20] argued that the share price reflects expected future profitability, risk (reflected in financial health, competitiveness, and leverage), dividend payment policy, and supply and demand for the financial asset in question. Indeed, according

to Pring [1998, p. 5], prices are a reflection of the hopes, fears, knowledge, optimism, and greed of the general investing public. Schreiber and Schwartz [1985] argued that the intrinsic value of assets is determined outside the market, but the market's clearing price is a price that must be discovered in the market. They argued that stocks have no intrinsic value, and it is the job of any trading system to discover prices. As Paleari and Vismara pointed out [2007], it is common for offerors and market analysts to 'overestimate' a company entering the market at its valuation. A high market valuation after going public is most desirable, as it increases the issuer's credibility in the eyes of investors and creates a positive image. On the one hand, a greater valuation may increase investor expectations and exert pressure on companies to list at a higher market valuation in the secondary market following their debut. Nevertheless, it may also limit the potential of the price for growth. Numerous empirical studies on the behaviour of market prices after the debut have observed that after companies go public, there is a significant loss in the market value of companies compared to their pre-publication value (e.g. Aggarwal, Rivoli, 1990; Jain, Kini, 1994; Jenkinson, Ljungqvist, 1996). They confirm that for abnormally high returns during the IPO period, returns calculated over the long term, i.e. from several months to several years, were negative compared to the market benchmark. An illustrative example of this is Allegro's IPO on the Warsaw Stock Exchange that took place in October 2020. The closing market price was PLN 70 against the allotment price of PLN 43 per share. A year after the IPO, the market valued the company's shares at the offering price, while in mid-December 2021 the market valuation fell below PLN 35.

Financial factors in the valuation of security price

The compromise concerning allocation price between the three parties, e.g. issuers, investment bankers, and investors, is the result of various negotiations and arrangements. It should be an indicator of the interests and capital needs of the company and its existing shareholders, and on the other hand, it should respond to the expectations of potential investors. Therefore, the level of the issue price is a response to how much value the existing shareholders agree to transfer to investors, and what the demand from potential investors is. As Bhagat et al. [2018] state, an IPO gives participants in the public capital market their first chance to evaluate a collection of corporate assets and expansion potential. The market value may be higher or lower than the fundamental value. This difference between them constitutes the level of underpricing.

Hanley [1993] and Loughran and Ritter [2002] showed that the correlation between the initial public offering (IPO) offer price and the preliminary filing range determines the direction of early stock returns. Despite being offered at a greater price, equities that are priced above the initial filing price range perform very well on the first day, whereas stocks that are priced below the initial filing price range perform poorly. As a result, the offer price is a partial adjustment to the information regarding investor demand that was obtained after the price conversation.

The process of finding the intrinsic value of a stock lies at the essence of fundamental analysis, which is a complex process involving several steps: analysis of the environment (macroeconomic analysis and industry analysis), internal analysis of the company (situational analysis and financial analysis of the company), and estimation of the company's intrinsic value [Borowski, 2018, p. 168; Malinowska, 2011, p. 106]. According to Kothari [2001], the analysis almost invariably estimates the correlation between the intrinsic value and the market value using data for a sample of publicly traded firms. The correlation between market values and the intrinsic value might be estimated directly using intrinsic values or indirectly by regressing market values on determinants of the intrinsic value.

This process involves the study of all the factors concerning the past, present, and future, which can affect the future income of enterprises, and therefore, constitute the foundations of its value. These factors determine the economic and financial situation of the company and the possibilities for its development. It is possible to determine the strength and direction of their impact on the share price. The totality of these factors with a quantifiable impact on value both in the short and long term can be divided into two groups, i.e.: endogenous (internal) factors and exogenous factors (coming from the environment). Roll [1988] identified three different factors influencing the expectations of capital market participants: common macroeconomic knowledge, industry-specific information, and company-specific information. Concerning IPOs, Ostrowska and Deryło [2015] distinguished the following determinants:

- determinants related to the company's environment: macroeconomic, resulting from the stock market situation, and behavioural;
- determinants related to the company's operation, which are determinants of opportunities for the company's development (greater access to sources of capital, marketing effects, an acquisition or merger with listed companies, objective valuation of the company, changes in management), and which are the threats to the company's development: costs of preparing and carrying out primary issuance, obligations related to information requirements, risks of loss of control over the company, risk of failure of the share issue.

Aggarwal et al. [2009] focused in their research on understanding the determinants of the levels of IPO values and not those of underpricing, they used two dependent variables e.g. offer value and first-day closing value, explaining that the difference between the first-day closing price (market value) and the offer price can be considered as the amount by which the investment bankers underprice the IPO. Similarly, Bhagat et al. [2018] argued it is the offer price that is of greater interest to investors, issuing companies, regulators, and investment bankers, but in their cross-sectional regression analysis they used market capitalization at the offer date as a dependent variable.

In light of the above, it should be noted that the allocation price is also affected by various factors. Sukacz [2005, p. 13] divides the factors determining the issue price into internal factors, directly related to the company's condition and growth prospects, and other factors, which primarily include the equity capital market situation, the condition in the industry,

the size of the public offering, the size and frequency of public offerings made by companies in the industry in which the company operates.

Łukasik [2010] divided the factors determining the issue price into fundamental and market factors. At the same time, fundamental factors can be retrospective (covering the company's past economic and financial position, including capital structure, past operating efficiency, liquidity, book value) and prospective (considering the impact of the company's capital development on its market value). Market factors, on the other hand, include the current state of the stock market, the direction of financial policy changes, current market quotations of companies in the same industry, expectations, competitiveness of other capital investments, among others. According to Tarczyński [1997, p. 173], the value of a company obtained as a result of fundamental analysis can be interpreted, among other things, as an economic value, and thus, a value that reflects the company's ability to multiply profits. Therefore, as a category that evolves with economic conditions and assumptions about the company's strategy, it has an objective dimension. In contrast, the value priced in the capital market takes into account both objective and subjective factors, which often are of a speculative character.

However, the end result of the valuation is undoubtedly influenced by a number of factors. From the point of view of a company, it is important to identify the fundamental factors affecting its value. However, in each enterprise these factors may be different. At the same time, the difference between the offering price and the market price on the first day of trading raises the question of whether issuers and investors are valuing offerings in accordance with the company's fundamentals.

Purnanandam and Swaminathan [2004] found that more overvalued IPOs have lower profitability, higher accruals, and higher analyst growth forecasts. Thus, when pricing IPOs, investors give too optimistic growth expectations too much weight and present profitability too little weight, which results in overvaluation at the offer price. They suggest that these results can be consistent with initial underpricing if underwriters tend to underprice not with respect to long-run fair value, but with respect to the maximum offer price (above the fair value) they could have set given the observed demand. In Abel and Eberly's [2005] model, the value of the firm consists of three components: the replacement cost of the firm's physical capital, the net present value of the firm's expected future cash flows from assets in place, and the value of growth options associated with future technological upgrades.

Some financial factors earnings, book value, and net income in the context of valuation were tested by Ohlson [1990, 1991, 1995], Rhodes-Kropf, Robinson and Viswanathan [2005], Aggarwal et al. [2009], Bhagat et al. [2018]. Aggarwal et al. [2009] found that firms with more negative earnings have higher valuations than firms with less negative earnings and firms with more positive earnings have higher valuations than firms with less positive earnings. They suggest that negative earnings are a proxy for growth options, which are a significant component of IPO firm value.

The relations between accounting-based fundamental signals and security prices have been the subject of many studies. Abarbanell and Bushee [1997, 1998] used financial statement

analysis of income statement and balance sheet ratios to forecast future earnings and stock returns. Piotroski [2000] found a positive relationship between the sign of the initial historical information and both future firm performance and subsequent quarterly earnings announcement reactions, suggesting that the market initially underreacts to the historical information. His results suggest that strong performers are distinguishable from eventual underperformers through the contextual use of relevant historical information. Abarbanell and Bushee [1998], and Piotroski [2000] demonstrated that the information in the earnings prediction signals is helpful in generating abnormal stock returns, which suggests market inefficiency with respect to financial statement information. According to Helwege and Liang [2004], current operating performance and performance in years following the IPO are helpful in evaluating the quality of firms which have most of their value in growth opportunities.

Some research proved that the dividend policy serves as a signal of firm value. In the model of Bhattacharya [1979], dividend policy serves as a signal of the future cash flow, whose distribution is known to management. Downes and Heinkel [1982] found that the dividend variable had a significant negative coefficient with the value, anomalous result may be due to the dividend variable proxying for some omitted not readily observable factor out of the valuation equation, for instance the investment opportunities of the firm where high dividends may indicate poor internal growth opportunities.

Determinants of underpricing: a literature review

Several variables were researched in the context of IPO underpricing. Listing requirements were examined by Johan [2010] and Carpentier et al. [2012]. The role of the legal system in protecting the investor rights and its impact on valuation were researched by La Porta et al. [1997]. Underwriter reputation was studied by He [2007], Carter and Manaster [1990], Chemmanur and Fulghieri [1994], Chemmanur and Krishnan [2012]; while auditor reputation by Beatty and Welch [1996]. Pre-IPO insider ownership was researched by Habib and Ljungqvist [2001], Bradley and Jordan [2002], Ljungqvist and Wilhelm [2003]. The correlations between IPO valuation and backing by VC were studied by Megginson and Weiss [1991], Johan [2010]. Ownership dispersion was examined by Booth and Chua [1996], Brennan and Franks [1997], Pham et al. [2003]. It must also be emphasized that also behavioural aspects are researched as well, for instance the phenomenon of 'positive' cascades described by Welch [1992] or social relations between investment bankers and fund managers studied by Brockman et al. [2023]. Fundamental variables such as accounting information and financial ratios were studied, among others, by Kim and Ritter [1999] and Purnanandam and Swaminathan [2004].

One of the first studies analyzing factors influencing underpricing in Poland is the research of Sukacz [2005, pp 151–157], who analyzed 185 IPOs in Poland between 1991 and 2002. He proved the percentage change of the WIG between the first trading day and the last day of the subscription period, the number of days between the end of the subscription period

and the first day trading date, the financial ratios (price to earnings ratio: P/E, price to book value ratio: P/BV) as statistically significant factors negatively affecting underpricing in the Polish market. Sieradzki [2016, pp. 149–163] pointed out that uncertainty as determined by the Parkinson's coefficient, the reduction rate and whether the company operates in a fashionable industry, have a positive statistically significant effect in the Polish market. In contrast, underpricing is negatively influenced by the higher proportion of shares offered to the company's total number of shares. According to Brycz et al. [2017], mandatory financial and accounting information significantly affects the success of the share issue and the value of the issued shares. They demonstrate that businesses that have more successful issuances because the pre-IPO ROE has a positive influence on investors' actions do not necessarily have higher post-IPO profits compared to businesses that have less successful pre-IPOs and less successful issuances. They proved that while companies with high performance before the IPO ensure a higher success of the issue, after the IPO they do not perform any better than those with companies with obviously lower efficiency ratios before going public. Kavalenka [2018] proved the factors concerning the market and offer having an impact on the degree of underpricing: involvement of PE and VC funds in the ownership structure of a company undertaking an IPO, new shares issued as a percentage of an IPO's total proceeds, ex-ante uncertainty measured by Parkinson's extreme value, an IPO price being set at the maximum of the book building range, turnover of shares traded on the debut date as well as the stock market return six months prior to an IPO. Pomykalski and Filipiak [2020] showed factors that have a statistically significant influence on initial public offering underpricing: the year of IPO (negative), risk-free rate (negative), and WIG close value (positive). Podedworna-Tarnowska [2022], analyzing the factors influencing indirect costs of an IPO proved two factors statistically significant and negatively affecting underpricing: monthly average percentage changes in interest rates for 12 months prior to IPO and year index. Interestingly, the year index yielded a statistically significant result and with each following year, the indirect costs of offering decreases by 3.09 pp. According to Lizińska and Czapiewski [2015], for IPOs carried out in Poland the level of net profitability of assets mattered, as the more profitable companies in the pre-issue period were more underpriced and, therefore, more favourably valued by investors on the day of the debut. The more positive the change in net profit during the pre-issue period (change in net profit measured by the percentage change in net profit in the pre-issue period compared to the previous period), the lower the underpricing on the WSE. Increases in profit may not be accompanied by corresponding increases in operating cash flow, which in turn may indicate the phenomenon of profit manipulation in pre-mission periods in order to build a favourable image for the company. Such results could be interpreted as a manifestation of a certain caution on the part of investors in showing exaggerated confidence in spectacular profit increases prior to the IPO. Zarzecki and Wołoszyn [2016] showed that high P/BV companies yield the highest initial returns. Mizerka and Lizińska [2017], based on the Polish market, confirmed the positive impact on the level of underpricing of the net return on assets – ROA in the pre-issue period (determined by the ratio of net profit to the

value of assets in the last reporting period before the listing), the historical underpricing recorded in the pre-issue period, the prosperity of the stock market in the six-month period prior to the IPO date, as measured by the average level of returns of the WIG index, and the volatility of returns in the short term after the IPO. Małachowski and Gadowska-dos Santos [2021] found three variables that influence the level of underpricing: the involvement of private equity or venture capital funds in the transaction, the rate of return of the WSE Index in the 6 months before the IPO, and the amount of capital offered during the debuts. They showed no statistical significance of the fundamental financial indicators: P/E, P/BV, ROE, ROA, EPS, and debt-to-equity ratio. This could suggest that investors do not make rational decisions based on the analysis of companies' financial statements.

Research method and data selection

Considering the presented literature review in the context of valuation in the IPO process, setting the allocation price, and the underpricing, the author wanted to study whether the accounting and financial information published in the prospectus and the provided information for valuing the company by investors plays an important role in signaling the quality of issuance and whether key financial performance indicators are associated with the underpricing.

Taking into account the above considerations in terms of affecting underpricing by pre-IPO financial performance indicators, the following hypothesis was posed: The fundamental factors of the company influence the level of underpricing.

The analysis covered companies debuting on the Warsaw Stock Exchange between 2005 and 2022. The original sample included 427 debuts. Consistent with the IPO literature [Loughran, Ritter, 1995, 2002, 2004], the following entities were excluded from the analysis: companies that changed the trading floor from MTS Ceto and NewConnect to the regulated market, companies debuting after a demerger by a spin-off, companies without a public offering, foreign companies, companies for which no data was available. The final sample included 227 companies. The empirical analysis and regression results estimation was based on manually collected data coming from the prospectuses of the debuted companies and from the statistics coming from the Warsaw Stock Exchange official webpage. The explanatory variable was the level of underpricing. To assess this, the price reaction to the IPO event was used, meaning the raw immediate rate of return expressed by the mathematical equation:

$$IR_{ia} = \frac{P_{i_c} - P_{i_a}}{P_{i_a}} \quad (1)$$

where:

P_{i_c} – the closing price of the i -th offer on the first day of trading,

P_{i_a} – the allocation price set in the i -th offer.

To prepare the econometric linear regression model, the stepwise forward variable selection procedure was carried out. Financial ratios in the pre-issue period were determined based on financial volumes from the last annual audited financial statements before the listing of shares. The following explanatory financial variables were selected as the base of variables from which selection was made:

- Assets of the company after logarithmic transformation;
- Revenues of the company after logarithmic transformation;
- ROS: ratio of net profit to value of sales;
- ROA: ratio of net profit to value of assets;
- ROE: ratio of net profit to book value of equity;
- LEVERAGE: ratio of total liabilities to assets;
- P/BV: ratio of price per share (max. estimated and presented in the prospectus price was used) to book value per share;
- P/E: ratio of price per share (max. estimated and presented in the prospectus price was used) to earnings per share;
- BVS: ratio of book value per share;
- EPS: ratio of earnings per share;
- Q-Tobin = [number of shares in the share capital before the issue x price per share (max. estimated and presented in the prospectus price was used) + liabilities]/assets;
- Liquidity: ratio of current assets to current liabilities;
- Dividend: dummy variable equals 1 if the dividend was paid for the last year before the issue, 0 otherwise.
- Age: age of the company,
- Company origin: dummy variable equals 1 if there was commitment of the State Treasury, 0 otherwise;
- Value of the offer after logarithmic transformation,
- Prior VC (PE) funding: dummy variable equals 1 if there was commitment of VC (PE) fund, 0 otherwise;
- FSCS: fraction of share capital sold in the IPO;
- DSO: dilution of shareholders outstanding.

Consequently, a linear model was estimated for the variables selected by a stepwise forward selection procedure and with underpricing as the dependent variable (equation 1).

$$IR = \text{const.} + \beta_1 DSO + \beta_2 P/E + \beta_3 BVS + \beta_4 EPS + \beta_5 \ln(\text{Assets}) + \beta_6 ROA \quad (2)$$

A Durbin-Watson test was also conducted to verify the presence of the autocorrelation of model residuals (resulting from, among others, the instability of variables or model mis-specification).

Results

The results of the estimation of the econometric model in which the endogenous variable is underpricing is presented in Table 1. The estimated model has low explanatory power ($R^2 = 12.7\%$). The F-statistics (5.316) indicates that the impact of all the variables combined is statistically significant. The statistical importance within 5% of the following variables has been found: BVS, EPS, and ROA. The higher EPS, the lower underpricing. The higher ROA and BVS, the higher underpricing. According to the Durbin-Watson statistics, the range of 1–2 indicates the absence or an insignificant level of autocorrelation.

Table 1. OLS regression results

| Model specification and results | | | | | | |
|---------------------------------|------------|---------|--------|-------|-----------|--------|
| Dep. Variable | Y total IR | | | | | |
| No. Observations | 227 | | | | | |
| Df Residuals | 220 | | | | | |
| Df Model | 6 | | | | | |
| Covariance Type | Nonrobust | | | | | |
| R-squared | 0.127 | | | | | |
| Adj. R-squared | 0.103 | | | | | |
| F-statistic | 5.316 | | | | | |
| Prob (F-statistic) | 3.84e-05 | | | | | |
| Log-Likelihood | 24.139 | | | | | |
| AIC | -34.28 | | | | | |
| BIC | -10.30 | | | | | |
| Variable | coef | std err | T | P> t | [0.025 | 0.975] |
| const | 0.1084 | 0.136 | 0.795 | 0.428 | -0.160 | 0.377 |
| DSO | 0.2017* | 0.103 | 1.952 | 0.052 | -0.002 | 0.405 |
| P/E | 0.0007* | 0.000 | 1.837 | 0.068 | -4.94e-05 | 0.001 |
| BVS | 0.0061*** | 0.002 | 3.516 | 0.001 | 0.003 | 0.010 |
| EPS | -0.0215*** | 0.006 | -3.434 | 0.001 | -0.034 | -0.009 |
| Ln Assets | -0.0187* | 0.010 | -1.789 | 0.075 | -0.039 | 0.002 |
| ROA | 0.4084*** | 0.142 | 2.872 | 0.004 | 0.128 | 0.689 |
| Tests of the model's results | | | | | | |
| Omnibus | 124.976 | | | | | |
| Durbin-Watson | 1.801 | | | | | |
| Prob (Omnibus) | 0.000 | | | | | |
| Jarque-Bera (JB) | 708.739 | | | | | |
| Skew | 2.172 | | | | | |
| Prob (JB) | 1.26e-154 | | | | | |
| Kurtosis | 10.487 | | | | | |
| Cond. No. | 564. | | | | | |

Notes:

Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Source: own study.

Table 2 includes OLS regression results without constant variable. The estimated model without constant variable has medium explanatory power ($R^2=29.3\%$). The F-statistics (15.23) indicates that the impact of all the variables combined is statistically significant. The statistical importance within 5% of the following variables has been found: DSO, BVS, EPS, Ln Assets and ROA. The higher EPS and assets, the lower underpricing. The higher ROA and BVS the higher underpricing. There is also a significant correlation between dilution of shareholders outstanding and underpricing. According to the Durbin-Watson statistics, the range of 1–2 indicates the absence or an insignificant level of autocorrelation.

Table 2. OLS regression results without the constant variable

| Model specification and results | | | | | | |
|---------------------------------|------------|---------|--------|------------|----------|--------|
| Dep. Variable | | | | Y total IR | | |
| No. Observations | | | | 227 | | |
| Df Residuals | | | | 221 | | |
| Df Model | | | | 6 | | |
| Covariance Type | | | | Nonrobust | | |
| R-squared (uncentered) | | | | 0.293 | | |
| Adj. R-squared (uncentered) | | | | 0.273 | | |
| F-statistic | | | | 15.23 | | |
| Prob (F-statistic) | | | | 1.38e-14 | | |
| Log-Likelihood | | | | 23.814 | | |
| AIC | | | | -35.63 | | |
| BIC | | | | -15.08 | | |
| Variable | coef | std err | t | P> t | [0.025 | 0.975] |
| DSO | 0.2381** | 0.093 | 2.572 | 0.011 | 0.056 | 0.420 |
| P/E | 0.0007* | 0.000 | 1.868 | 0.063 | -3.8e-05 | 0.001 |
| BVS | 0.0057*** | 0.002 | 3.431 | 0.001 | 0.002 | 0.009 |
| EPS | -0.0217*** | 0.006 | -3.456 | 0.001 | -0.034 | -0.009 |
| Ln Assets | -0.0117** | 0.006 | -2.064 | 0.040 | -0.023 | -0.001 |
| ROA | 0.4518*** | 0.131 | 3.444 | 0.001 | 0.193 | 0.710 |
| Tests of the model's results | | | | | | |
| Omnibus | | | | 124.606 | | |
| Durbin-Watson | | | | 1.794 | | |
| Prob (Omnibus) | | | | 0.000 | | |
| Jarque-Bera (JB) | | | | 699.545 | | |
| Skew | | | | 2.169 | | |
| Prob (JB) | | | | 1.25e-152 | | |
| Kurtosis | | | | 10.426 | | |
| Cond. No. | | | | 464. | | |

Notes:

Significance level: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

[1] R^2 is computed without centring since the model does not contain a constant.

[2] Standard Errors assume that the covariance matrix of the errors is correctly specified.

Source: Author's own study.

Summary

In this study, the statistical significance of several explanatory variables has been confirmed, i.e. financial ratios, which are key factors in the company's fundamental analysis. These results are complementary to the studies presented in the article conducted in the Polish market, in which other fundamental factors were confirmed [Brycz et al., 2017; Lizińska, Czapiewski, 2015; Małachowski, Gadowska-dos Santos, 2021; Mizerka, Lizińska, 2017; Sukacz, 2005; Zarzecki, Wołoszyn, 2016]. However, it must be admitted that there is only a limited ability to explain the underpricing of IPOs using the accounting measures presented in the prospectus. This is consistent with Kim and Ritter's research [1999]. Taking into consideration that investors have very limited information on new issue companies, there is no strict evidence that conveyed or signalled information by the issuers in the prospectuses is useful for valuing their shares. Moreover, the limitation of the study is analyzing the variables mainly on the basis of financial values, without either micro- or macroeconomic background. This should be considered in further research.

Although the most common method of valuing companies going public is to use the multiples of per group companies, unfortunately, accounting data is in many cases too an unreliable valuation measure to facilitate strong testing, particularly because many companies going public are valued based on growth options rather than historical financial performance, which is of limited benefit in assessing the market value, and consequently underpricing. This is in line with the views of Kasiewicz [2009], who argues that this is due to the fact that individual and institutional investors attach more importance to the information about the future, i.e. the company's development intentions, than indicating their financial and economic results achieved so far. They also focus on analyzing the opinions of financial analysts, who evaluate the company benchmarked to the overall market, the industry, and the direct activities of competitors. This fits in the concept of value management, which has created an entirely new quality for the realization of investors' goals and the development of the capital market.

References

1. Abarbanell, J., Bushee, B. (1997). Fundamental analysis, future earnings, and stock prices. *Journal of Accounting Research*, 35(1), pp. 1–24, <http://dx.doi.org/10.2307/2491464>
2. Abarbanell, J., Bushee, B. (1998). Abnormal returns to a fundamental analysis strategy. *The Accounting Review*, 73(1), pp. 19–45.
3. Abel, A.B., Eberly, J.C. (2012). Investment, Valuation, and Growth Options. *The Quarterly Journal of Finance*, 2(1), pp. 1–32, <http://dx.doi.org/10.1142/S2010139212500012>
4. Aggarwal, R., Bhagat, S., Rangan, S. (2009). The Impact of Fundamentals on IPO Valuation. *Financial Management*, 38(2), pp. 253–284, <http://dx.doi.org/10.1111/j.1755-053X.2009.01035.x>

5. Aggarwal, R., Rivoli, P. (1990). Fads in the Initial Public Offering Market? *Financial Management*, 19(4), pp. 45–57, <https://doi.org/10.2307/3665609>
6. Bear, R.M., Curley, A.J. (1975). Unseasoned Equity Financing. *The Journal of Financial and Quantitative Analysis*, 10(2), pp. 311–325, <http://dx.doi.org/10.2307/2979038>
7. Beatty, R.P., Welch, I. (1996). Issuer Expenses and Legal Liability in Initial Public Offerings. *The Journal of Law & Economics*, 39(2), pp. 545–602. <http://dx.doi.org/10.1086/467359>
8. Bhagat, S., Lu, J., Rangan S. (2018). IPO Valuation: The International Evidence. In: D. Cumming, S.A. Johan (Eds.). *The Oxford Handbook of IPO* (pp. 108–145). New York: Oxford University Press.
9. Bhattacharya, S. (1979). Imperfect Information, Dividend Policy, and ‘the Bird in the Hand’ Fallacy. *Bell Journal of Economics*, 10(1), pp. 259–270.
10. Booth, J.R., Chua, L. (1996). Ownership dispersion, costly information, and IPO underpricing. *Journal of Financial Economics*, 41(2), pp. 291–310, [http://dx.doi.org/10.1016/0304-405X\(95\)00862-9](http://dx.doi.org/10.1016/0304-405X(95)00862-9)
11. Borowski, K. (2018). *Metody inwestowania na rynkach finansowych*. Warszawa: Difin.
12. Boulton, T.J., Smart, S.B., Zutter, C.J. (2017). Conservatism and international IPO underpricing. *Journal of International Business Studies*, 48(6), pp. 763–785, <http://dx.doi.org/10.1057/s41267-016-0054-8>
13. Bradley, D.J., Jordan, B.D. (2002). Partial Adjustment to Public Information and IPO Underpricing. *The Journal of Financial and Quantitative Analysis*, 37(4), pp. 595–616, <http://dx.doi.org/10.2307/3595013>
14. Brennan M.J., Franks, J. (1997). Underpricing, Ownership and Control in Initial Public Offerings of Equity Securities in the U.K. *Journal of Financial Economics*, 45(3), pp. 391–413.
15. Brockman P., He X., Sun S., Zou H. (2023). The role of individual investment bankers in IPO pricing: Evidence from investor bidding behavior. *Journal of Corporate Finance*, 82, 102431, <http://dx.doi.org/10.1016/j.jcorpfin.2023.102431>
16. Carpentier C., Cumming D., Suret J.M. (2012). The Value of Capital Market Regulation: IPOs Versus Reverse Mergers. *Journal of Empirical Legal Studies*, 9(1), pp. 56–91, <http://dx.doi.org/10.1111/j.1740-1461.2011.01247.x>
17. Chemmanur, T.J., Fulghieri, P. (1994). Investment Bank Reputation, Information Production, and Financial Intermediation. *Journal of Finance*, 49(1), pp. 57–79, <http://dx.doi.org/10.1111/j.1540-6261.1994.tb04420.x>
18. Chemmanur, T.J., Krishnan, K. (2012). Heterogeneous Beliefs, IPO Valuation, and the Economic Role of the Underwriter in IPOs. *Financial Management*, 41(4), pp. 769–811, <http://dx.doi.org/10.1111/j.1755-053X.2012.01201.x>
19. Chemmanur, T.J., Liu, M.H. (2019). How Should a Firm Go Public? A Dynamic Model of the Choice between Fixed-Price Offerings and Auctions in IPOs and Privatizations. *Review of Corporate Finance Studies*, 8(1), pp. 42–96, <http://dx.doi.org/10.1093/rcfs/cfy006>
20. Downes, D.H., Heinkel, R. (1982). Signaling and the valuation of unseasoned new issue. *The Journal of Finance*, 37(1), pp. 1–10, <http://dx.doi.org/10.1111/j.1540-6261.1982.tb01091.x>
21. Habib, M.A., Ljungqvist, A.P. (2001). Underpricing and Entrepreneurial Wealth Losses in IPOs: Theory and Evidence. *The Review of Financial Studies*, 14(2), pp. 433–458, <http://dx.doi.org/10.1093/rfs/14.2.433>

22. He, P. (2007). Theory of IPO Waves. *The Review of Financial Studies*, 20(4), pp. 983–1020, <http://dx.doi.org/10.1093/revfin/hhm004>
23. Helwege, J., Liang, N. (2004). Initial Public Offerings in Hot and Cold Markets. *The Journal of Financial and Quantitative Analysis*, 39(3), pp. 541–569, <http://dx.doi.org/10.1017/S0022109000004026>
24. Ibbotson, R.G., Ritter, J.R. (1995). Initial Public Offerings. In: R.A. Jarrow, V. Maksimovic, W.T. Ziemba (Eds.). *Handbooks in Operations Research and Management Science*, Volume 9 Finance (pp. 993–1016). North Holland.
25. Jain B., Kini O. (1994). The Post-Issue Operating Performance of IPO Firms. *Journal of Finance*, 49(5), pp. 1699–1726, <https://doi.org/10.1111/j.1540-6261.1994.tb04778.x>
26. Jaki, A. (2004). *Wycena przedsiębiorstwa. Przesłanki, procedury, metody*. Kraków: Oficyna Ekonomiczna.
27. Jenkinson, T. Ljungqvist, A. (1996). *Going Public. The Theory and Evidence on how Companies Raise Equity Finance*. Oxford: Clarendon Press.
28. Johan, S.A. (2010). Listing standards as a signal of IPO preparedness and quality. *International Review of Law and Economics*, 30(2), pp. 128–144, <http://dx.doi.org/10.1016/j.irl.2009.12.001>
29. Jones, S.L., Yeoman, J.C. (2018). Survey and Synthesis of the IPO Underpricing Literature: The Fixed-Offer Price Constraint as a Unifying Core Explanation. In: D. Cumming, S.A. Johan (Eds.). *The Oxford Handbook of IPO* (pp. 146–174). New York: Oxford University Press..
30. Kasiewicz, S. (2009). Koncepcja zarządzania wartością jako źródło kryzysu finansowego. *Finansowanie Nieruchomości*, 07–09, pp. 56–63.
31. Kasiewicz, S., Mączyńska E. (1999). Metody wyceny bieżącej wartości przedsiębiorstwa. In: A. Herman, A. Szablewski (Eds.). *Zarządzanie wartością firmy* (pp. 139–149). Warszawa: Poltext.
32. Kavalenka, Y. (2018). Determinants of IPO Underpricing on the Warsaw Stock Exchange. *Finanse, Rynki Finansowe, Ubezpieczenia*, 1(91), pp. 257–267, <http://dx.doi.org/10.18276/frfu.2018.91-21>.
33. Kim M., Ritter, J.R. (1999). Valuing IPOs. *Journal of Financial Economics*, 53(3), pp. 409–437, [http://dx.doi.org/10.1016/S0304-405X\(99\)00027-6](http://dx.doi.org/10.1016/S0304-405X(99)00027-6)
34. Kothari, S.P. (2001). Capital markets research in accounting. *Journal of Accounting and Economics*, 31(1–3), pp. 105–231, [http://dx.doi.org/10.1016/S0165-4101\(01\)00030-1](http://dx.doi.org/10.1016/S0165-4101(01)00030-1)
35. La Porta R., Lopez-De-Silanes, F., Shleifer A., Vishny R.W. (1997). Legal Determinants of External Finance. *The Journal of Finance*, 52(3), pp. 1131–1150, <http://dx.doi.org/10.1111/j.1540-6261.1997.tb02727.x>
36. Lizińska, J., Czapiewski, I. (2015). Determinanty underpricingu w Polsce i na innych rynkach wschodzących. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, 386, pp. 112–125, <http://dx.doi.org/10.15611/pn.2015.386.08>
37. Ljungqvist, A. (2007). IPO Underpricing. In: B.E. Eckbo (Ed.). *Handbook of Corporate Finance, Empirical Corporate Finance*, Volume 1 (pp. 375–422). New Hampshire: North Holland.
38. Ljungqvist, A.P., Wilhelm Jr., W.J. (2003). IPO Pricing in the Dot-com Bubble. *The Journal of Finance*, 58(2), pp. 723–752, <http://dx.doi.org/10.1111/1540-6261.00543>
39. Loughran, T., Ritter, J.R. (2002). Why Don't Issuers Get Upset about Leaving Money on the Table in IPOs? *The Review of Financial Studies*, 15(2), pp. 413–443, <http://dx.doi.org/10.1093/rfs/15.2.413>

40. Łukasik, G. (2010). Fundamentalne i rynkowe czynniki ustalania ceny emisyjnej akcji. *Annales Universitatis Mariae Curie-Skłodowska. Sectio H. Oeconomia*, 44(2), pp. 639–648.
41. Małachowski, P., Gadowska-dos Santos, D. (2021). What Determines the Success of an IPO? Analysis of IPO Underpricing on the Warsaw Stock Exchange. *Central European Economic Journal*, 8(55), pp. 1–14, <https://doi.org/10.2478/ceej-2021-0001>
42. Malinowska, U. (2011). Analiza fundamentalna przedsiębiorstwa. In: M. Panfil, A. Szablewski (Eds.). *Wycena przedsiębiorstwa. Od teorii do praktyki* (pp. 105–130). Warszawa: Poltext.
43. Megginson, W.L., Weiss K.A. (1991). Venture capitalist certification in initial public offerings. *The Journal of Finance*, 46(3), pp. 879–903, <http://dx.doi.org/10.1111/j.1540-6261.1991.tb03770.x>
44. Mizerka, J., Lizińska, J. (Eds.). (2017). *Pierwsze oferty publiczne w Polsce i na świecie. Kontrowersje wokół anomalii rynkowych*. Warszawa: CeDeWu.
45. Ohlson, J. (1991), The theory of value and earnings and an introduction to the Ball-Brown analysis. *Contemporary Accounting Research*, 8(1), pp. 1–19, <http://dx.doi.org/10.1111/j.1911-3846.1991.tb00831.x>
46. Ohlson, J.A. (1990). Synthesis of security valuation theory and the role of dividends, cash flows, and earnings. *Contemporary Accounting Research*, 6(2), pp. 648–676, <http://dx.doi.org/10.1111/j.1911-3846.1990.tb00780.x>
47. Ohlson, J., (1995). Earnings, Book Values, and Dividends in Equity Valuation. *Contemporary Accounting Research*, 11(2), pp. 661–687, <http://dx.doi.org/10.1111/j.1911-3846.1995.tb00461>.
48. Ostrowska, E., Deryło, M. (2015). Determinanty rozwoju rynku emisji pierwotnych akcji na Giełdzie Papierów Wartościowych w Warszawie. *Zeszyty Naukowe Uniwersytetu Ekonomicznego w Krakowie*, 1(937), pp. 101–114, <http://dx.doi.org/10.15678/ZNUEK.2015.0937.0107>
49. Palaria, S. Vismara, S. (2007). Over-optimism when pricing IPOs. *Managerial Finance*, 33(6), pp. 352–267, Doi: 10.1108/03074350710748722
50. Pham, P.K., Kalev, P.S., Steen, A.B. (2003). Underpricing, Stock Allocation, Ownership Structure and Post-listing Liquidity of Newly Listed Firms. *Journal of Banking & Finance*, 27(5), pp. 919–947, [http://dx.doi.org/10.1016/S0378-4266\(02\)00241-8](http://dx.doi.org/10.1016/S0378-4266(02)00241-8)
51. Piotroski, J. (2000). Value investing: the use of historical financial statement information to separate winners from losers. *Journal of Accounting Research*, 38, pp. 1–44, <http://dx.doi.org/10.2307/2672906>
52. Podedworna-Tarnowska, D. (2022). Costs of IPO in Poland. *Annales Universitatis Mariae Curie-Skłodowska, Sectio H–Oeconomia*, 56(4), pp. 135–160, <http://dx.doi.org/10.17951/h.2022.56.4.135-160>
53. Pomykalski, P., Filipiak, P. (2020). Factors Influencing IPO Underpricing in Poland. *Acta Universitatis Lodzianensis, Folia Oeconomica*, 4(349), pp. 7–21, <http://dx.doi.org/10.18778/0208-6018.349.01>
54. Pring M.J. (1998). *Podstawy analizy technicznej*: Warszawa: WIG-Press.
55. Purnanandam, A.K., Swaminathan, B. (2004), Are IPOs Really Underpriced? *The Review of Financial Studies*, 17(3), pp. 811–848, <http://dx.doi.org/10.1093/rfs/hhg055>
56. Ritchie, J.C. (1997). *Analiza fundamentalna*. Warszawa: WIG-Press.
57. Ritter, J. (2003). Investment Banking and Securities Issuance. In: G.M. Constantinides, M. Harris, R.M. Stulz (Eds.). *Handbook of the Economics of Finance*, Volume 1A (pp. 255–306). North Holland.

58. Ritter, J.R., Welch, I. (2002). A Review of IPO Activity, Pricing, and Allocations. *Journal of Finance*, 57(4), pp. 1795–1828, <http://dx.doi.org/10.1111/1540-6261.00478>
59. Roll, R., (1988). R². *The Journal of Finance*, 43(3), pp. 541–566, <http://dx.doi.org/10.1111/j.1540-6261.1988.tb04591.x>
60. Schreiber, P., Schwartz R.A. (1985). Efficient price discovery in a securities market: The objective of a trading system. In: Y. Amihud, T.S.Y. Ho, R.A. Schwartz (Eds.). *Market Making and the Changing Structure of the Securities Industries* (pp. 19–39). Lexington Books.
61. Sherman, A.E. (2005). Global trends in IPO methods: Book building versus auctions with endogenous entry. *Journal of Financial Economics*, 78(3), pp. 615–649, <http://dx.doi.org/10.1016/j.jfineco.2004.09.005>
62. Sieradzki R. (2016). *Niedowartościowanie pierwotnych ofert publicznych na przykładzie akcji notowanych na Giełdzie Papierów Wartościowych w Warszawie*, Rozprawa doktorska. Kraków: Uniwersytet Ekonomiczny w Krakowie.
63. Sukacz, D. (2005). *Pierwsze oferty publiczne na rynkach kapitałowych*. Warszawa: CeDeWu.
64. Tarczyński, W. (1997). *Rynki kapitałowe*. Warszawa: Placet.
65. Welch, I. (1992). Sequential Sales, learning, and Cascades. *The Journal of Finance*, 47(2), pp. 695–732, <http://dx.doi.org/10.1111/j.1540-6261.1992.tb04406.x>
66. Zarzecki D. (1998). *Teoria i praktyka metod dochodowych w wycenie przedsiębiorstw*. Szczecin: Uniwersytet Szczeciński.
67. Zarzecki, D., Wołoszyn, A. (2016). The Impact of Value and Growth Companies on IPO Underpricing on the Polish Capital Market. *Finanse, Rynki Finansowe, Ubezpieczenia*, 4(82), pp. 325–334, <http://dx.doi.org/10.18276/frfu.2016.4.82/2-28>