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## Article

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Baltic Journal of Economics

## Provided in Cooperation with:

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*Suggested Citation:* Brycz, Bogumila; Dudycz, Tadeusz; Kowalski, Michal J. (2017) : Is the success of an issuer an investor success? Evidence from Polish IPOs, Baltic Journal of Economics, ISSN 2334-4385, Taylor & Francis, London, Vol. 17, Iss. 1, pp. 57-77, <https://doi.org/10.1080/1406099X.2017.1308781>

This Version is available at:

<https://hdl.handle.net/10419/180100>

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To cite this article: Bogumiła Brycz, Tadeusz Dudycz & Michał J. Kowalski (2017) Is the success of an issuer an investor success? Evidence from Polish IPOs, *Baltic Journal of Economics*, 17:1, 57-77, DOI: [10.1080/1406099X.2017.1308781](https://doi.org/10.1080/1406099X.2017.1308781)

To link to this article: <https://doi.org/10.1080/1406099X.2017.1308781>



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Published online: 12 Apr 2017.



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# Is the success of an issuer an investor success? Evidence from Polish IPOs

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## ABSTRACT

This article examines the factors that determine IPO success in raising equity capital, and how this success translates into investor success. The study is based on a sample of IPOs on the Warsaw Stock Exchange from 1998 to 2011. We find that pre-IPO profitability is a strong and positive signal for investors that translates into a higher offer price and therefore determines the success of the issuance. However, companies with high IPO success do not provide investors with better performance after going public, nor do they provide protection before the common phenomenon of long-term underperformance. A large-scale value migration between shareholders occurs in companies that achieve IPO success. The investor belief that pre-IPO profitability is a signal of the future earnings potential of an IPO firm indicates that they probably use simple heuristics and have a representativeness bias.

## ARTICLE HISTORY

Received 19 June 2016  
Accepted 2 March 2017

## KEYWORDS

Equity issue; signals; IPO; initial public offering; Warsaw Stock Exchange; profitability; WSE

## JEL CLASSIFICATION

G10; G12; G14; O16

## 1. Introduction

The capital market is a place that brings together companies offering investment opportunities – securities – and investors seeking opportunities to best allocate their capital. Shares of initial public offerings (IPOs) are a special type of investment opportunity. IPO companies may offer new, primary shares to the public, or existing secondary shares that previously belonged to insiders, or both at the same time. Kim and Weisbach (2008) show that the majority of IPOs involve primary offerings; the world average for primary-only IPOs is above 75%. The highest rate of primary-only offerings is in Asian countries, excluding Japan (more than 95% of the proceeds of the IPOs), and the lowest proportion of primary shares is on the European stock market (about 54% of the proceeds). Only the sale of new shares provides a company with new capital, and in such cases a common motive of IPO is to raise capital to finance investments (Kim & Weisbach, 2008).

If the need for capital is the major reason for going public, then the success of an IPO is measured by the amount of capital raised by the firm. Selling new shares leads, on the one hand, to capital inflows to the firm, but on the other hand, it may lead pre-IPO shareholders to lose control over the company, prompting them to reduce the number of shares sold. In order to maximize the amount of capital raised by selling a limited

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number of shares, IPO firms must maximize the percentage increase in shareholders' equity for each percentage of firm ownership sold during the IPO. Only companies that do this are able to raise large amounts of capital for new investments without losing control over the company, and this is why we measure IPO success in raising capital in this article as a relation of the percentage increase in shareholders' equity to the percentage of firm ownership sold at the IPO.

IPO companies are new players on the capital market, and therefore investors have little knowledge of them, which intensifies the information asymmetry between investors and issuers. Because issuers and investors deal with asymmetric information, 'signalling theory' is used in this article to explain their behaviour. Strategic signalling refers to actions taken by a signaller to influence the views and behaviours of receivers (Zmud, Shaft, Zheng, & Croes, 2010). Since the early papers of Ross (1977) and Leland and Pyle (1977), in which the choice of financial structure was described as a signal sent to the market, signalling theory continues to be an important component of research in finance. In the context of IPO, the main focus of signalling theory is to communicate positive information in order to convey the positive attributes of IPO firms to investors (Connelly, Certo, Ireland, & Reutzel, 2011), and the literature reports many signals that have had a positive impact on the valuation of new issues. Chemmanur and Paeglis (2005) indicate that companies with better management make better investment and financing decisions, and consequently there is a positive relationship between the quality of a firm's management and its long-term post-IPO operating and stock performance. Accordingly, the appointment of a diverse group of prestigious directors sends a message to potential investors about a firm's legitimacy (Certo, 2003; Filatotchev & Bishop, 2002). An important role in signalling the quality of issuance is played by the financial and accounting information published in the prospectus (Kim, Krinsky, & Lee, 1994, 1995). For example, Firth and Liao-Tan (1997) find that such signalling variables as historical profitability, retained ownership, and age of the business provide incremental information for valuing an IPO; however, sometimes the differentiation between high- and low-quality IPO firms is more difficult. Teoh, Welch, and Wong (1998) suggest that a history of strong earnings signals future strong performance.

Signalling theory provides the framework for this study to evaluate the impact of pre-IPO factors (such as profitability, size of IPO firms, leverage, investors' optimism, and terms of issuance) on the success of issuers. Our findings confirm that investors guided by the high profitability reported before the IPO agree to pay a high offer price, ensuring the success of issuers. The next issue we examine is whether investors benefit from this as well – in other words, whether the signalling process is as effective for investors as it is for issuers. If the parameters perceived by investors as good signals would reflect the fundamental value of companies, the investors paying a high price for the shares would ensure the success of not only issuers but also themselves. We find, unfortunately, that companies with a greater success of issuance at the IPO associated with higher pre-IPO profitability do not achieve better performance in the future. On the other hand, when investors pay a high price for the shares, they provide the company with a lot of capital, but at the same time they acquire the rights to a relatively small portion of the company's profits, which in the investigated period of time leads to the value migration between pre- and post-IPO shareholders (new investors who bought primary shares

issued at the IPO are called post-IPO shareholders in this article). The scale of this migration is also examined in this article.

Our study makes several key contributions. Based on empirical investigation, we first identify factors that influence the success of issuers in raising capital on the Warsaw Stock Exchange (WSE). Secondly, we provide empirical evidence that signals that ensured success for issuers does not mean the same for investors, which, to our knowledge, has not been previously examined. Thirdly, we find that companies with high IPO success in raising capital lead to large-scale value migration between initial and new shareholders. Another novelty of the article is the use of a new measure of success in raising capital. In previous studies, the proceeds divided by total assets (at the end of the IPO year or at the beginning of the IPO year) (Alti, 2006; Çelik & Akarim, 2013; Kim & Weisbach, 2008) and the nominal value of proceeds (Amini, 2013; Callaghan, Kleiman, & Sahu, 1999; Deeds, Decarolis, & Coombs, 1997; Gulati & Higgins, 2003; Mousa, Wales, & Harper, 2015; Zimmerman, 2008) have been used. Our measure reflects the point of view of issuers and is appropriate to measure their success.

Our article is organized as follows. Section 2 provides a literature review and the hypotheses for our investigation. Section 3 describes the data and variables used in this study. In Section 4, we present and discuss the empirical results, and Section 8 concludes the article.

## 2. Literature review and research hypotheses

A private company may choose to go public for a number of reasons, including to increase prestige and visibility, to raise equity capital to finance investments, to improve access to debt financing, to create public shares for acquisitions, to enable the initial shareholders to sell shares and diversify their holdings, or to exploit favourable investor sentiment. The academic literature describes substantial research addressing this problem. Pagano, Panetta, and Zingales (1998), using a database containing information on 69 Italian firms that went public between 1982 and 1992, concluded that Italian firms go public to exploit mispricing and to rebalance their capital structure after a period of high investment and growth rather than to finance subsequent investment. Brau and Fawcett (2006), on the basis of survey results involving 336 chief financial officers, indicate that the two most important motivations for going public are to create public shares for use in future acquisitions and to establish the market price or value of the firm. Based on findings from Brau and Fawcett's (2006) survey, Celikyurt, Sevilir, and Shivdasani (2010) investigated the acquisition motive of IPOs. Their results show that IPOs significantly change the ability of firms to conduct acquisitions. IPO firms make acquisitions early on after the IPO by using the initial capital raised at the IPO, as well as through ongoing access to public equity and debt markets. Kim and Weisbach (2008) examined the motives for public equity offerings, both IPOs and seasoned equity offerings, in 38 countries, and their results strongly suggest that when IPOs include the issuance of new shares, then one motive behind IPO is to raise capital to finance investment. On the other hand, they also found that not all equity offerings appear to be used to finance investment; some are made to take advantage of favourable valuations.

Without a doubt, raising capital to finance a firm's growth is one of the most important reasons for going public when it is connected with the issuance of primary shares;

however, this does not preclude the existence of other factors that influence the decision about whether to go public. Starting with Taggart (1977), there are a number of studies, such as of Baker and Wurgler (2000), Loughran and Ritter (1995), Pástor and Veronesi (2005), Ritter (1991), and Ritter and Welch (2002), indicating that firms are able to time their share issues accordingly to obtain low-cost equity capital when a firm's shares in the market are overvalued. Brau and Fawcett (2006) found that companies opportunistically time their IPOs to take advantage of strong overall markets and industry conditions, and they indicate that the timing of an IPO is also strongly influenced by the need for capital to support growth. Similarly, Lowry (2003) provides empirical support that a firm's demands for capital and changes in the level of investor optimism significantly affect that firm's decision to go public.

Motivations for going public on the Polish capital market were examined by Meluzin and Zinecker (2014), and their survey results indicate that raising external capital for further growth is an important reason for IPO. If the need for capital is the major reason for going public, then the success of an IPO is measured by the amount of capital raised by the firm. Numerous studies have analysed the factors that determine this success. Some have examined the impact of market conditions on the amount of equity issued by IPO firms. For example, Alti (2006) reports that in the US, the average IPO proceeds of hot-market firms amount to 75.61% of pre-IPO total assets, whereas the same ratio for the average cold-market firm is 53.76%. Similarly, Çelik and Akarim (2013) report that in Turkey the average proceeds from the sale of primary shares amount to 98% of pre-IPO total assets for hot-market issuers and 68% for cold-market issuers. Other studies have examined the impact of firm-specific capabilities on the amount of capital raised in an IPO. For example, in their research on biotechnology firms, Deeds et al. (1997) examined the impact of variables such as the location of the firm, the quality of the research staff, the number of products in development, the number of patents held by the firm, and the firm's prior spending on R&D. Amini (2013) analysed the relevance of spatial proximity to London in explaining the amount of money raised by small British firms at IPO and found that spatial proximity to London does have a significant impact; however, contrary to many other studies, he also found that the impacts of profitability, firm age, and hot-market condition are not significant. This is surprising, because, for example, McConaughy, Dhatt, and Kim (1995) suggest that firms that perform well before going public have a better chance of success afterwards. Pagano et al. (1998) suggest that firms that achieve sharp increases in profits may go public hoping that investors will perceive the high profitability as permanent and will overvalue their shares. Teoh et al. (1998) indicate that investors are guided by the earnings reported before the IPO, and, unaware that issuers may manipulate reported earnings before going public, they agree to pay a high offer price and are disappointed later.

We therefore hypothesize that a high level of the pre-IPO profitability may be a positive signal for investors, which translates into a higher offer price and thus determines the success of issuers in raising capital. This is because there is high information asymmetry at the IPO time between investors and issuers. To mitigate this asymmetry, investors seek additional information that may signal the future earnings potential of the IPO firm. The main financial variables in which they may be interested, based mainly on the information contained in prospectuses, are different measures of profit and profitability. Investors tend to believe that companies that are highly profitable before going public

after IPO will invest their capital with the same or even better efficiency; however, a number of studies have found that IPO firms underperform after the issue.

The underperformance phenomenon was documented first in the US and then in many other countries, based both on accounting measures of firm performance (Auret & Britten, 2008; Cai & Wei, 1997; Jain & Kini, 1994; Khurshed, Paleari, & Vismara, 2005; Kim, Kitsabunarat, & Nofsinger, 2004; Mikkelsen, Partch, & Shah, 1997; Pagano et al., 1998) and market measures of firm performance (Álvarez & González, 2005; Carter, Dark, & Singh, 1998; Jaskiewicz, González, Menéndez, & Schiereck, 2005; Loughran & Ritter, 1995; Ritter, 1991). Sometimes, albeit much less frequently, an abnormal positive performance is seen, as for example on the Swedish and Greek markets (Gajewski & Gresse, 2006). On the Polish stock market, the long-term operating underperformance was noted by Dudycz (2013). The market underperformance of IPO firms that went public on the Polish stock market was documented by Jelic and Briston (2003), Jewartowski and Lizińska (2012), and Lizińska and Czapiewski (2014).

At the beginning of our study, we therefore investigate whether profitability measures before IPO act as a signal of the quality of management for investors, and thus whether they have an impact on investor behaviour determining the issuer success in raising capital. We then investigate whether issuers who achieve greater IPO success in raising capital provide investors with better performance after the issue, or whether they instead increase their value at the expense of new shareholders, leading to large-scale value migration between the initial and new shareholders. The literature about value migration between shareholders is very poor and is connected only with corporate takeovers (Bellamy & Lewin, 1992; Comment & Schwert, 1995).

On the basis of the above discussion, we formulate the following three hypotheses:

H1: Pre-IPO profitability strongly determines the success of share issuance.

H2: Issuers with high IPO success do not assure high rates of return for investors after issuance.

H3: The IPO contributes to value migration between pre- and post-IPO shareholders. As a result of IPO, the initial shareholders achieve significantly higher returns on capital employed in the company than the returns achieved by post-IPO shareholders. The difference between the return achieved by pre- and post-IPO shareholders depends on the IPO success ratio.

### 3. IPO success ratio and sample description

The main variable in the study is a measure of success in raising equity capital. It can be calculated in different ways, but we want it to capture two crucial factors determining success from the pre-IPO shareholder perspective: how many shares will be sold and the price at which they will be sold. Pre-IPO shareholders are interested in raising capital as much as possible, but on the other hand, they are not interested in selling many rights to share capital because this may lead to a loss of control over the company. Our measure of success in raising equity capital is therefore the percentage increase in shareholders' equity divided by the percentage of shares sold via the issuance of primary shares calculated as follows:

$$\text{IPO success ratio}_i = \frac{\% \Delta SE_i}{\% \text{ shares sold}_i} = \frac{\text{Proceeds}_i / SE_{i,t-1}}{\text{NoS}_{PS_i} / (\text{NoS}_{IS_i} + \text{NoS}_{PS_i})},$$

where Proceeds<sub>*i*</sub> are defined as the IPO proceeds of firm *i* from the sale of primary shares,  $SE_{i,t-1}$  is defined as total shareholders' equity of firm *i* at the end of the year before IPO (calculated as the difference between total assets and total liabilities),  $NoS_{PS_i}$  is the number of primary shares of firm *i* issued in the IPO, and  $NoS_{IS_i}$  is the number of outstanding shares before the IPO, that is, the number of shares belonging to the initial shareholders. Thus, the first component of the IPO success ratio,  $\% \Delta SE$ , measures the percentage increase in the shareholders' equity through the issuance of primary shares during IPO, and the second component,  $\% \text{ shares sold}$ , measures the fraction of firm ownership sold via the issuance of primary shares. Therefore, the IPO success ratio indicates the percentage increase in shareholders' equity per each percentage of firm ownership sold at the IPO.

The study was done for the main market of the WSE based on a sample of the IPO firms that went public from 1998 to 2011 (total number of IPOs is reported in Panel A of Table 1). This initial sample of 454 IPOs was reduced by excluding:

- (1) financial institutions (e.g. banks and insurance companies),
- (2) IPOs that were not connected with new common stock issuance,
- (3) IPOs for which data were incomplete.

The final sample consisted of 250 IPOs. The primary source of data used in this study was the Notoria Service database.

Panel A of Table 1 shows the variations in the sample number of IPOs over these 14 years. Panel B of Table 1 presents basic characteristics of the sample IPOs, that is, size of the companies measured by total assets, as well as the basic statistics of IPO success in raising capital measured by the IPO success ratio. The first component of our IPO success ratio, the percentage increase in shareholders' equity, is not stable over time. Conversely, the second component of our IPO success ratio, the fraction of firm ownership sold during the IPO, is exceptionally stable in all periods analysed. IPO firms sell about 24% of total outstanding shares, on average.

## 4. Determinants of the IPO success ratio

### 4.1. Research methods

To test the first hypothesis, we investigated the determinants of IPO success in raising capital measured by the IPO success ratio. We conducted a regression analysis in which the IPO success ratio was the dependent variable, and we used the following variables as explanatory variables:

- (1) Size – we used two variables to examine whether the size of companies influences success in raising capital through IPO: total assets ( $\ln \text{Assets}_{i,t-1}$ ) and sales revenue ( $\ln \text{Sales}_{i,t-1}$ ).
- (2) Profitability – we used three profitability ratios: return on sales ( $\text{ROS}_{i,t-1}$ ), return on assets ( $\text{ROA}_{i,t-1}$ ), and return on equity ( $\text{ROE}_{i,t-1}$ ).
- (3) Leverage – we used three variables to examine the impact of the level of leverage: debt ratio ( $D/A_{i,t-1}$ ), long-term debt ratio ( $LD/LC_{i,t-1}$ ), and shareholders' equity-to-fixed-assets ratio ( $SE/FA_{i,t-1}$ ).



**Table 1.** Sample characteristics.

		1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	1998–2011
<i>Panel A</i>																
Total number of IPOs		51	20	11	7	5	6	36	58	63	81	31	13	34	38	454
Sample number of IPOs		26	15	9	5	2	5	24	22	26	52	22	9	21	12	250
The sample number of IPOs to the total number of IPOs (%)		51.0	75.0	81.8	71.4	40.0	83.3	66.7	37.9	41.3	64.2	71.0	69.2	61.8	31.6	55.1
<i>Panel B</i>																
Assets (PLN mil.)	Mean	44.4	142.5	596.2	36.1	86.1	134.9	130.5	1044.6	116.8	100.1	496.1	2723.6	129.7	115.2	334.3
	Median	34.6	52.5	39.4	36.8	86.1	122.0	74.2	52.4	53.3	61.9	29.0	69.9	93.9	96.3	52.4
	Std dev.	35.2	172.4	1,158.3	33.2	52.8	57.0	212.7	3134.6	169.6	152.2	1868.1	7158.3	146.2	85.6	1767.5
	Min.	5.8	9.5	10.4	3.5	48.7	59.6	7.1	1.0	0.9	4.7	3.2	41.5	10.2	19.9	0.9
	Max.	168.2	523.7	3465.7	85.6	123.4	212.3	1061.1	14,564.7	652.9	756.1	8789.0	21,762.1	508.3	242.4	21,762.1
%ΔSE (%)	Mean	98.6	118.4	90.1	133.0	75.3	118.3	207.7	196.3	416.5	294.7	138.0	44.3	117.7	87.8	197.0
	Median	56.6	59.5	67.5	101.1	75.3	125.6	185.6	63.3	229.1	188.8	101.2	32.1	76.9	76.7	111.7
	Std dev.	99.3	169.3	79.9	101.3	57.3	43.7	160.5	322.6	498.8	313.8	126.5	38.5	94.3	56.7	272.2
	Min.	8.5	7.0	14.7	49.4	34.8	72.6	22.5	16.6	37.3	25.7	1.3	3.1	9.5	25.1	1.3
	Max.	405.2	636.2	282.0	280.4	115.8	176.6	636.9	1409.4	2341.7	1709.7	404.9	120.4	382.2	201.4	2341.7
% shares sold (%)	Mean	29.1	24.2	28.3	26.8	22.1	27.9	29.6	25.7	26.3	25.5	18.1	18.1	21.4	17.3	24.8
	Median	24.6	20.0	23.7	21.7	22.1	22.9	30.1	27.2	25.9	20.0	17.7	15.5	20.3	17.2	21.9
	Std dev.	18.9	18.3	12.9	16.0	20.6	13.4	10.2	13.4	11.7	16.1	9.5	12.5	9.5	8.4	14.0
	Min.	8.6	4.9	14.7	13.8	7.5	14.8	13.3	5.1	9.1	6.3	0.4	2.7	3.5	7.4	0.4
	Max.	84.2	61.9	50.0	50.0	36.7	46.7	55.3	50.0	54.0	93.8	38.6	46.4	36.6	30.1	93.8
IPO success ratio	Mean	3.5	5.5	3.5	4.9	3.9	4.9	6.9	8.5	17.4	11.1	7.6	2.3	6.6	5.7	8.2
	Median	2.3	2.8	2.9	5.1	3.9	5.2	6.0	4.1	8.8	9.0	5.0	2.0	3.7	6.4	5.1
	Std dev.	2.8	7.6	3.4	1.9	1.0	2.2	4.3	16.9	22.6	7.9	7.3	1.1	7.9	3.2	11.1
	Min.	0.6	0.5	0.7	2.5	3.2	1.6	1.3	0.8	2.5	2.3	1.2	1.1	1.1	1.6	0.5
	Max.	10.9	30.7	11.9	6.9	4.6	7.5	16.1	81.5	106.0	38.4	29.8	4.8	35.7	11.2	106.0

- (4) Terms of issue – we used two variables to examine whether the terms of share issue influence success in raising capital through IPO: the ratio of issue price to the nominal value of shares ( $IP/NV_{i,t}$ ) and the ratio of book value per share to the nominal value of shares ( $BV/NV_{i,t-1}$ ).
- (5) Economic conditions – we used GDP growth rate ( $GDP\ growth_t$ ) as a proxy to measure economic conditions.
- (6) Investor optimism – we used three variables as proxies for investor optimism: WIG index ( $WIG_t$ ), price-to-earnings ratio ( $P/E_t$ ), and price to book value ratio ( $P/BV_t$ ). Because  $P/E_t$  and  $P/BV_t$  are used as proxies to measure investor optimism, they are calculated as the average ratios for the whole market.

The explanatory variables are defined in [Table 2](#).

In order to investigate whether multicollinearity is present among the variables, we examined the correlation coefficients between the variables. Finally, after excluding explanatory variables that highly correlated with each other and slightly correlated with the dependent variable, we included five independent variables in our regression model: total assets ( $\ln Assets_{i,t-1}$ ), return on equity ( $ROE_{i,t-1}$ ), debt ratio ( $D/A_{i,t-1}$ ), ratio of issue price to the nominal value of shares ( $IP/NV_{i,t}$ ), and WIG index ( $WIG_t$ ).

## 4.2. Results

The results in [Table 3](#) indicate that there are four highly significant determinants of the success of the share issue: size, profitability, leverage, and investor optimism. The impact of the terms of share issue is insignificant.

**Table 2.** Independent variable definitions.

Variable	Definition
$\ln Assets_{i,t-1}$	Natural logarithm of total assets of firm $i$ at the end of year $t-1$
$\ln Sales_{i,t-1}$	Natural logarithm of net revenue of firm $i$ for year $t-1$
$ROA_{i,t-1}$	Return on assets of firm $i$ for year $t-1$ defined as profit (loss) on operating activities for year $t-1$ divided by total assets at the end of year $t-1$
$ROE_{i,t-1}$	Return on equity of firm $i$ for year $t-1$ defined as net income for year $t-1$ divided by shareholders' equity calculated as the difference between total assets and total liabilities at the end of year $t-1$
$ROS_{i,t-1}$	Return on sales of firm $i$ for year $t-1$ defined as profit (loss) on operating activities for year $t-1$ divided by net revenue from sales for year $t-1$
$D/A_{i,t-1}$	Debt ratio of firm $i$ for year $t-1$ defined as total debt (the sum of current liabilities and long-term liabilities) at the end of year $t-1$ divided by total assets at the end of year $t-1$
$LD/LC_{i,t-1}$	Long-term debt ratio of firm $i$ for year $t-1$ defined as long-term liabilities at the end of year $t-1$ divided by the sum of long-term debt and shareholders' equity at the end of year $t-1$
$SE/FA_{i,t-1}$	Shareholders' equity-to-fixed-assets ratio of firm $i$ for year $t-1$ defined as shareholders' equity at the end of year $t-1$ to total fixed assets at the end of year $t-1$
$IP/NV_{i,t}$	Ratio of issue price to the nominal value of shares for firm $i$ measured at the time of IPO
$BV/NV_{i,t-1}$	Ratio of book value per share to the nominal value of shares for firm $i$ , where the book value per share is measured at the end of year $t-1$
$WIG_t$	Value of the WSE Index calculated as an average for the year $t$
$GDP\ growth_t$	GDP growth rate defined as the percentage change in gross domestic product during year $t$
$P/E_t$	Price-to-earnings ratio calculated as an average annual rate for all companies listed on the WSE main market in year $t$
$P/BV_t$	Price to book ratio calculated as an average annual rate for all companies listed on the WSE main market in year $t$

Note: The time subscript  $t$  denotes the IPO year, and  $t-1$  the last year before the IPO.

**Table 3.** Regression analysis of the determinants of IPO success in raising capital.

	Independent variables				
	Ln Assets <sub><i>i,t-1</i></sub>	ROE <sub><i>i,t-1</i></sub>	D/A <sub><i>i,t-1</i></sub>	WIG <sub><i>t</i></sub>	IP/NV <sub><i>i,t</i></sub>
Standardized coefficient	-0.269***	0.420***	0.150***	0.217***	0.026
Standard error	0.051	0.053	0.050	0.050	0.051
<i>R</i>	0.649				
<i>R</i> <sup>2</sup>	0.422				
Adj. <i>R</i> <sup>2</sup>	0.410				
<i>F</i>	35.585				

Notes: This table reports the results of the regressions from the following model:

$$Y_{i,t} = +\beta_1 \text{LnAssets}_{i,t-1} + \beta_2 \text{ROE}_{i,t-1} + \beta_3 D/A_{i,t-1} + \beta_4 \text{WIG}_t + \beta_5 \text{IP/NV}_{i,t} + \varepsilon_t.$$

The dependent variable  $Y_{i,t}$  is the IPO success ratio for firm  $i$  in year  $t$ . The independent variables are defined in Table 2. The constant term is not reported. (\*), (\*\*), and (\*\*\*) indicate that coefficients are significant at 10, 5, and 1 per cent levels of significance, respectively.

Profitability has the largest positive impact on IPO success in raising capital. A high level of pre-IPO profitability positively affects the pricing of the IPOs and therefore the amount of capital raised through the IPO. According to signalling theory, it transmits positive information about firm value. Investors believe that IPO firms will invest their capital with the same or better efficiency than before going public.

The size of the companies is the second most influential factor, but it has a negative impact on the dependent variable. Investors prefer to invest in companies with a high growth potential, and they may be afraid that large firms do not have large growth opportunities because they are at the top of their business life cycle, and that further investments in their development will not bring the expected efficiency. Investors may also be afraid that their capital will not be used to finance further development but for other purposes that will not provide the expected benefits.

Investor optimism is the next factor that influences the success of IPO firms in raising capital. When there is a general optimism on the market, investors price shares higher, and therefore firms can raise more capital. This is consistent with the findings of other researchers, such as Alti (2006), Derrien (2005), Lowry (2003), Pástor and Veronesi (2005), Ritter and Welch (2002), and Taggart (1977).

Leverage is the last variable in our model that has a significant impact on IPO success in raising capital. Huyghebaert and Van Hulle (2006) (based on the findings of Goergen, 1998), Pagano and Roell (1998), and Rydqvist and Högholm (1995) indicate that companies use the capital raised from the stock market to reduce their leverage rather than to finance their growth; however, this was not confirmed on the Polish stock exchange (Dudycz, 2013). Therefore, a high level of leverage may be a positive signal for investors, since it may suggest that the new capital will be used for new investments because such firms have a limited ability to raise further capital by borrowing.

## 5. Pre-IPO profitability and the success of share issuance

### 5.1. Research methods

The results of the regression analysis support the view that investors pay attention to pre-IPO profitability in valuing IPO firms, which determines success in raising capital through

IPO. In order to study this phenomenon in more detail, in the next step we classified IPOs into quartiles based on the IPO success ratio, and then we used a parametric one-way ANOVA and non-parametric Kruskal–Wallis test to investigate differences in pre-IPO profitability ( $ROE_{t-1}$  and  $ROA_{t-1}$ ) between the four quartiles. Then we used range tests, a parametric Tukey's test, and *post hoc* test for the Kruskal–Wallis test to compare the average  $ROE_{t-1}$  and  $ROA_{t-1}$  in each quartile.

## 5.2. Results

Table 4 presents the mean and median pre-IPO profitability for each quartile of IPOs classified based on the IPO success ratio. In column 'IPO success ratio quartile' and column ' $ROE_{t-1}$ ' in Panel A of Table 4, we see that companies that were in the first quartile of the issue's success (IPO success ratio between 0.5 and 2.58) at the end of the year before IPO achieved, on average, an ROE of 11.6%. For companies in subsequent quartiles, the average ROE systematically increases so that companies in the fourth quartile (IPO success ratio between 9.69 and 105.96) achieved on average an ROE of 38.84%. The results of range tests are presented in Panel B of Table 4 (column 'IPO success ratio quartile' and column ' $ROE_{t-1}$ '). The differences in ROE achieved by companies in the first and second quartiles are not statistically significant, which means that in the low ROE its impact on the IPO success is weak. There is, however, a weak statistical significance of the differences between the second and third quartiles and between

**Table 4.** Operating performance achieved by companies before IPO.

Panel A: Pre-IPO operating performance

IPO success ratio quartile	$ROE_{t-1}$		$ROA_{t-1}$	
	Mean (%)	Median (%)	Mean (%)	Median (%)
$Q_1$ (0.5÷2.58)	11.60	9.56	9.54	8.91
$Q_2$ (2.61÷5.02)	14.86	13.41	9.51	7.34
$Q_3$ (5.15÷9.51)	25.15	24.76	14.71	14.27
$Q_4$ (9.69÷105.96)	38.84	36.76	19.03	14.87
Total	22.63	19.03	13.20	10.65
$F$		12.0800 (.0000)		7.0316 (.0001)
Kruskal–Wallis test		47.5382 (.0000)		20.1350 (.0002)

Panel B: Range tests

IPO success ratio quartile	$ROE_{t-1}$		$ROA_{t-1}$	
	Yes/No	Statistical significance	Yes/No	Statistical significance
$Q_2 > Q_1$	Yes	/	No	/
$Q_3 > Q_1$	Yes	**/**	Yes	/**
$Q_4 > Q_1$	Yes	***/**	Yes	***/**
$Q_3 > Q_2$	Yes	/**	Yes	/***
$Q_4 > Q_2$	Yes	***/**	Yes	***/**
$Q_4 > Q_3$	Yes	**/	Yes	/

Notes: Panel A presents mean and median for the return on equity (ROE) and return on assets (ROA) achieved by companies at the end of the year before IPO. Analysed companies are grouped according to the quartiles of IPO success ratio. The one-way ANOVA and Kruskal–Wallis test were used. *P*-values are presented in parentheses.

Panel B presents the results of range tests. The *post hoc* Tukey test (the first indicator before slash) and non-parametric Kruskal–Wallis test (the second indicator after slash) were used. (\*), (\*\*), (\*\*\*) indicate that the differences are significant at 10, 5 and 1 per cent levels of significance, respectively.

the third and fourth quartiles, as well as a strong statistical significance of the differences between the fourth quartile and the first and second quartiles. Accordingly, we can infer that only a high level of profitability measured by ROE is a good signal for investors and assures a high valuation of shares sold and the success of IPO. By analogy, analysing the reliance between the IPO success ratio and ROA, we see that ROA is also a good signal for investors, although with less power (column 'ROA<sub>t-1</sub>' of Table 4). We can conclude that for investors, ROE is a better signal of the company quality than ROA. This is surprising because ROE is based on net profit and therefore is more susceptible to accounting manipulation, performance deviation, and tax policy. ROA based on profit on operating activities is less susceptible to accounting manipulation and performance deviation, and therefore it is closer to company foundations and should be a better signal of future performance.

## 6. Post-IPO performance

### 6.1. Research methods

As indicated above, a high ROE achieved by companies at the end of the year before IPO is a good signal for investors, assuring issuance success; however, this good signal causes the exaggerated trust of investors and may turn out to have disastrous effects. To evaluate whether the greater success of issuers in raising capital translates into higher returns for investors, we examined accounting rates of return and stock returns. Specifically, we used the same two measures of accounting returns – ROA and ROE – and two measures of long-term stock returns: cumulative abnormal return (CAR) and buy-and-hold abnormal return (BHAR). The accounting returns were calculated for three periods after the IPO, that is, at the end of the IPO year and at the end of the two subsequent years. The stock returns were calculated as follows:

$$CAR_K = \sum_{k=1}^K \left[ \frac{\sum_{i=1}^N (R_{ik} - R_{Bk})}{N} \right],$$

$$BHAR_K = \frac{1}{N} \sum_{i=1}^N \left[ \prod_{k=1}^K (1 + R_{ik}) - \prod_{k=1}^K (1 + R_{Bk}) \right],$$

where  $R_{ik}$  is the return on IPO firm  $i$  in month  $k$ ,  $R_{Bk}$  is the return on the benchmark portfolio in month  $k$ ,  $N$  is the number of IPO firms, and  $K$  is the number of months. The benchmark portfolio return  $R_B$  is based on the WIG index. Long-term abnormal stock returns were calculated for three intervals: 12, 24, and 36 months after going public. Because the appearance of extreme outliers could affect the results, we removed cases from our analysis for which abnormal stock returns were greater than  $Q_3 + 3 \cdot (Q_3 - Q_1)$  or less than  $Q_1 - 3 \cdot (Q_3 - Q_1)$ , where  $Q_1$  is the first quartile and  $Q_3$  the third quartile.

Similarly to the procedure in the previous step, we classified IPOs into quartiles based on the IPO success ratio, and then we used a parametric one-way ANOVA and non-parametric Kruskal–Wallis test to investigate differences in rates of return between the four quartiles, followed by the *post hoc* tests. Moreover, we used the parametric *t*-test and the non-parametric Wilcoxon signed rank test in order to test whether the negative value of CAR and BHAR is statistically significant.

## 6.2. Results

In column ' $ROE_{t-1}$ ' in Panel A of Table 4, we can see a higher ROE before IPO is connected to a higher IPO success ratio; however, just at the end of the IPO year, the relationship between these two measures is weak (Table 5, Panel A, column ' $ROE_t$ '). The high level of IPO success is only marginally reflected in firm operating performance measured by ROE in a year of issuance. Statistically significant differences in ROE at the end of the IPO year are observed only between companies in the third/fourth quartile of the IPO success ratio and companies in the first quartile. We can suppose that the relationship between ROE and the IPO success ratio will be observed in subsequent years as the companies invest the raised capital. The data do not confirm that. In the first and second years after IPO, there is no relationship between company performance measured by ROE and the IPO success ratio (Table 5, Panel A, columns ' $ROE_{t+1}$ ' and ' $ROE_{t+2}$ '). The range tests we conducted do not show that the ROE achieved by companies belonging to particular quartiles differs with statistical significance.

We can observe similar relationships for ROA (Panels C and D of Table 5). The level of IPO success is not reflected in the ROA achieved by companies at the end of the IPO year or at the end of the two subsequent years. The differences between ROA for companies belonging to each quartile of the IPO success ratio are not statistically significant. In the IPO year and in the first year after IPO, a weak statistical significance for the differences is observed only between the third and first quartiles. In the second year after IPO, the differences between quartiles are not statistically significant.

The results reported in Panel A of Table 6 indicate that the long-term abnormal stock returns for Polish IPO firms are negative. The mean (median) CAR is  $-8.58\%$  ( $-11.99\%$ ),  $-10.16\%$  ( $-9.32\%$ ), and  $-16.70\%$  ( $-19.02\%$ ) for the first, second, and third years after going public, respectively (almost all statistically significant at the .01 level). The negative average abnormal returns are also reflected in a steady decline of the BHAR. The mean (median) BHAR is  $-10.40\%$  ( $-19.22\%$ ) and  $-22.48\%$  ( $-25.21\%$ ) for the one- and two-year holding periods, respectively, and it falls to  $-33.43\%$  ( $-36.15\%$ ) for the three-year holding period (all statistically significant at the .01 level). In summary, consistent with numerous previous studies conducted in many countries, including Poland, our results confirm the long-term underperformance phenomenon.

Panel B of Table 6 presents the long-term abnormal stock returns for each group of IPO firms, classified into quartiles based on the IPO success ratio. There are no visible systematic patterns between the amount of success in raising capital and long-run stock abnormal return. Moreover, no statistically significant differences between averages of CAR and BHAR across quartiles are observed. The results suggest that investing in IPO firms with high profitability before going public does not provide investors with high returns over the long term.

## 7. Value migration

### 7.1. Research methods

The presented phenomenon means that after IPO we can consider value migration between initial shareholders and post-issue shareholders. In order to examine this value

**Table 5.** Post-IPO returns depending on IPO success ratio.

*Panel A: Post-IPO operating performance*

IPO success ratio quartile	ROE <sub>t</sub>		ROE <sub>t+1</sub>		ROE <sub>t+2</sub>	
	Mean (%)	Median (%)	Mean (%)	Median (%)	Mean (%)	Median (%)
Q <sub>1</sub> (0.5÷2.58)	4.93	7.17	1.75	4.39	−10.46	3.58
Q <sub>2</sub> (2.61÷5.02)	8.43	9.76	−5.77	7.54	−14.98	5.09
Q <sub>3</sub> (5.15÷9.51)	12.53	13.05	8.25	11.02	−3.96	5.41
Q <sub>4</sub> (9.69÷105.96)	11.22	11.25	3.00	6.84	−3.62	3.52
Total	9.27	10.19	1.81	7.18	−8.16	4.48
F		2.9549 (.0331)		1.0711 (.3620)		0.3293 (.8042)
Kruskal–Wallis test		20.7541 (.0001)		10.9122 (.0122)		3.1574 (.3680)

*Panel B: Range tests*

IPO success ratio quartile	ROE <sub>t</sub>		ROE <sub>t+1</sub>		ROE <sub>t+2</sub>	
	Yes/No	Statistical significance	Yes/No	Statistical significance	Yes/No	Statistical significance
Q <sub>2</sub> >Q <sub>1</sub>	Yes	/	No	/	No	/
Q <sub>3</sub> >Q <sub>1</sub>	Yes	**/**	Yes	/**	Yes	/
Q <sub>4</sub> >Q <sub>1</sub>	Yes	/**	Yes	/	Yes	/
Q <sub>3</sub> >Q <sub>2</sub>	Yes	/	Yes	/	Yes	/
Q <sub>4</sub> >Q <sub>2</sub>	Yes	/	Yes	/	Yes	/
Q <sub>4</sub> >Q <sub>3</sub>	No	/	No	/	No	/

*Panel C: Post-IPO operating performance*

IPO success ratio quartile	ROA <sub>t</sub>		ROA <sub>t+1</sub>		ROA <sub>t+2</sub>	
	Mean (%)	Median (%)	Mean (%)	Median (%)	Mean (%)	Median (%)
Q <sub>1</sub> (0.5÷2.58)	6.04	6.45	1.60	3.95	0.89	3.29
Q <sub>2</sub> (2.61÷5.02)	6.87	6.78	4.61	5.23	−2.80	3.52
Q <sub>3</sub> (5.15÷9.51)	10.53	12.60	7.55	7.29	3.30	4.32
Q <sub>4</sub> (9.69÷105.96)	8.31	7.70	3.02	5.10	−2.47	2.91
Total	7.93	7.34	4.18	5.38	−0.27	3.36
F		2.8167 (.0397)		2.7313 (.0444)		0.8339 (.4763)
Kruskal–Wallis test		17.6386 (.0005)		11.3917 (.0098)		4.1096 (.2499)

*Panel D: Range tests*

IPO success ratio quartile	ROA <sub>t</sub>		ROA <sub>t+1</sub>		ROA <sub>t+2</sub>	
	Yes/No	Statistical significance	Yes/No	Statistical significance	Yes/No	Statistical significance
Q <sub>2</sub> >Q <sub>1</sub>	Yes	/	Yes	/	No	/
Q <sub>3</sub> >Q <sub>1</sub>	Yes	**/**	Yes	**/**	Yes	/
Q <sub>4</sub> >Q <sub>1</sub>	Yes	/	Yes	/	No	/
Q <sub>3</sub> >Q <sub>2</sub>	Yes	/**	Yes	/	Yes	/
Q <sub>4</sub> >Q <sub>2</sub>	Yes	/	No	/	Yes	/
Q <sub>4</sub> >Q <sub>3</sub>	No	/	No	/	No	/

Notes: Panel A presents means and medians for return on equity (ROE) at the end of the year of IPO and one and two years after IPO. Companies are grouped according to quartiles of IPO success ratio. The one-way ANOVA and Kruskal–Wallis tests were used. *P*-values are presented in parentheses. Analogical data for return on assets (ROA) are presented in Panel C.

Panels B and D present the results of range tests for ROE and ROA, respectively. Returns for each quartile pair are compared, Yes/No means that a relationship in Column One is confirmed/not confirmed. The *post hoc* Tukey test (the first indicator before slash) and non-parametric Kruskal–Wallis test (the second indicator after slash) were used. (\*), (\*\*), (\*\*\*) indicate that the differences are significant at 10, 5 and 1 per cent levels of significance, respectively.

**Table 6.** Long-term post-IPO abnormal stock returns depending on IPO success ratio.*Panel A:* Long-term post-IPO abnormal stock returns

	CAR			BHAR		
	1-year	2-year	3-year	1-year	2-year	3-year
Mean (%)	-8.58	-10.16	-16.70	-10.40	-22.48	-33.43
Median (%)	-11.99	-9.32	-19.02	-19.22	-25.21	-36.15
Std dev (%)	50.54	74.39	83.07	44.52	54.45	64.60
Student's <i>t</i> -test	-2.6839 (.0078)	-2.1556 (.0321)	-3.1591 (.0018)	-3.6720 (.0003)	-6.3427 (.0000)	-7.9846 (.0000)
Wilcoxon's signed rank test	3.0367 (.0024)	2.7517 (.0059)	3.0160 (.0026)	4.5943 (.0000)	6.9272 (.0000)	7.5094 (.0000)

*Panel B:* Long-term post-IPO abnormal stock returns by IPO success ratio quartiles

IPO success ratio quartile	1-year CAR		2-year CAR		3-year CAR	
	Mean (%)	Median (%)	Mean (%)	Median (%)	Mean (%)	Median (%)
Q <sub>1</sub> (0.5÷2.58)	-15.32	-17.04	-9.04	-13.00	-9.28	-8.03
Q <sub>2</sub> (2.61÷5.02)	-8.88	-22.11	-10.23	-12.48	-30.16	-26.23
Q <sub>3</sub> (5.15÷9.51)	-7.81	-14.33	-8.37	-0.73	-16.01	-21.72
Q <sub>4</sub> (9.69÷105.96)	-2.30	3.10	-13.03	-15.86	-11.67	-18.38
<i>F</i>	0.7003 (.5527)		0.0469 (.9865)		0.7762 (.5083)	
Kruskal–Wallis test	2.1669 (.5385)		0.7604 (.8589)		1.7206 (.6324)	
IPO success ratio quartile	1-year BHAR		2-year BHAR		3-year BHAR	
	Mean (%)	Median (%)	Mean (%)	Median (%)	Mean (%)	Median (%)
Q <sub>1</sub> (0.5÷2.58)	-16.30	-23.52	-22.74	-25.20	-26.25	-35.15
Q <sub>2</sub> (2.61÷5.02)	-15.89	-28.54	-26.63	-36.42	-42.51	-48.33
Q <sub>3</sub> (5.15÷9.51)	-5.40	-14.91	-24.25	-23.08	-37.15	-31.48
Q <sub>4</sub> (9.69÷105.96)	-4.12	-4.61	-16.70	-23.29	-27.75	-31.13
<i>F</i>	1.3544 (.2574)		0.3555 (.7852)		0.8549 (.4652)	
Kruskal–Wallis test	5.8504 (.1191)		2.7235 (.4363)		2.8636 (.4131)	

Notes: Panel A presents descriptive statistics for the cumulative abnormal return (CAR) and buy-and-hold abnormal return (BHAR) calculated for three intervals: 12, 24 and 36 months after going public, starting from the first day of trading and using the WIG Index as a benchmark. A parametric *t*-test and non-parametric Wilcoxon signed rank test were used. *P*-values are presented in parentheses. Panel B presents the means and medians of CAR and BHAR for IPO firms, classified into quartiles based on IPO success ratio. A one-way ANOVA and Kruskal–Wallis test were used. *P*-values are presented in parentheses.

migration and at the same time test the third hypothesis, we used two measures of investment efficiency: NPV (net present value) and ROI (return on investment).

Firstly, for each firm we calculated NPV separately for initial and post-issue shareholders and expressed it per share as follows:

$$NPV_{IS,i} = \left( -SE_{i,-1} + \sum_{t=0}^2 \frac{EBIT_{IS,i,t}}{(1+dR)^t} \right) / NoS_{IS,i},$$

$$NPV_{PS,i} = \left( -Proceeds_i + \sum_{t=0}^2 \frac{EBIT_{PS,i,t}}{(1+dR)^t} \right) / NoS_{PS,i},$$

where  $NPV_{IS,i}$  and  $NPV_{PS,i}$  are net present value for initial and post-issue shareholders of firm *i*, respectively;  $SE_{i,-1}$  is the total shareholders' equity of firm *i* at the end of the year before IPO used as the capital invested by initial shareholders;  $Proceeds_i$  is the IPO proceeds from the sale of primary shares of firm *i* used as the capital invested by post-issue shareholders;  $EBIT_{IS,i,t}$  is the profit (loss) on operating activities of firm



$i$  in year  $t$  that belongs to the initial shareholders (i.e. it is calculated as  $EBIT_{IS,i,t} = EBIT_{i,t} \cdot (NoS_{IS,i} / (NoS_{PS,i} + NoS_{IS,i}))$ );  $EBIT_{PS,i,t}$  is the profit (loss) on operating activities of firm  $i$  in year  $t$  that belongs to the post-issue shareholders (i.e. it is calculated as  $EBIT_{PS,i,t} = EBIT_{i,t} \cdot (NoS_{PS,i} / (NoS_{PS,i} + NoS_{IS,i}))$ );  $NoS_{IS,i}$  and  $NoS_{PS,i}$ , as earlier, are the number of shares of firm  $i$  belonging to the pre- and post-issue shareholders, respectively;  $t=0$  is the IPO year,  $t=1$  is the first and  $t=2$  the second year after the IPO; and  $dR$  is an arbitral discount rate that is the same for each analysed firm (the discount rate does not really matter in the context of our methodology because, in the end, we analysed the relative variable).

The final measure we examined was a percent difference between the NPV for initial and post-issue shareholders calculated as follows:  $Diff\ NPV_{IS}$  and  $NPV_{PS} = (NPV_{IS,i} - NPV_{PS,i}) / |NPV_{IS,i}|$ . The absolute value of the NPV for initial shareholders in the denominator was used to adjust the formula in such a way that it was consistent with the common-sense interpretation because we had to deal with negative numbers in several cases.

The second measure we used was ROI. For each firm, we calculated the average value of ROI for initial and post-issue shareholders separately as follows:

$$ROI_{IS,i} = \frac{1}{3} \sum_{t=0}^2 \frac{EBIT_{IS,i,t}}{SE_{i,t-1}},$$

$$ROI_{PS,i} = \frac{1}{3} \sum_{t=0}^2 \frac{EBIT_{PS,i,t}}{Proceeds_i},$$

where  $ROI_{IS,i}$  and  $ROI_{PS,i}$  are the average return on investment for initial and post-issue shareholders of firm  $i$ , respectively; the other variables have been defined before.

The final measure we examined was a percent difference between the average ROI for initial and post-issue shareholders calculated as follows:  $Diff\ ROI_{IS}$  and  $ROI_{PS} = (ROI_{IS,i} - ROI_{PS,i}) / |ROI_{IS,i}|$ , where  $|ROI_{IS,i}|$  is an absolute value of the average ROI for the initial shareholders of firm  $i$ .

Analogously to previous steps, we analysed the relationship between  $Diff\ NPV_{IS}$  and  $NPV_{PS}$ ,  $Diff\ ROI_{IS}$  and  $ROI_{PS}$  and the IPO success ratio. We classified IPOs into quartiles based on the IPO success ratio, and then we used range tests to compare the average measures in each quartile of the IPO success ratio.

## 7.2. Results

The greater IPO success achieved by initial shareholders, the greater capital raised compared to the percentage of firm ownership sold via the issuance. This caused value migration from pre- to post-IPO shareholders. Panel B of [Table 2](#) shows that the initial shareholders selling on average 24.8% of share in share capital raised their equity capital, on average, by 197%. This means that by selling relatively few ownership rights to the firm, the initial shareholders maintain a comparatively large number of rights to the firm's future profits. The results reported in Panel A of [Table 7](#) indicate that NPV for initial shareholders is on average about nine times greater (Winsorized mean) than for post-issue shareholders, and ROI is on average 41% greater for initial than for post-issue

**Table 7.** Comparison of investment efficiency for initial and post-issue shareholders.

Panel A: Investment efficiency for initial and post-issue shareholders						
IPO success ratio quartile	Diff NPV <sub>IS</sub> and NPV <sub>PS</sub>			Diff ROI <sub>IS</sub> and ROI <sub>PS</sub>		
	Mean	Winsor Mean	Median	Mean	Winsor Mean	Median
Q <sub>1</sub> (0.5÷2.58)	1.1349	0.7073	0.3342	0.1077	0.1140	0.2066
Q <sub>2</sub> (2.61÷5.02)	4.8862	4.4056	3.1948	0.4176	0.4178	0.6061
Q <sub>3</sub> (5.15÷9.51)	22.0206	12.8595	7.1483	0.6189	0.6200	0.7983
Q <sub>4</sub> (9.69÷105.96)	33.7786	23.2120	9.7495	0.4704	0.4722	0.8904
Total	15.4711	9.3499	4.6907	0.4036	0.4077	0.6583
F	6.0008			7.9899		
		(.0006)			(.0000)	
Kruskal–Wallis test		139.5587			77.7750	
		(.0000)			(.0000)	
Panel B: Range tests						
IPO success ratio quartile	Diff NPV <sub>IS</sub> and NPV <sub>PS</sub>		Diff ROI <sub>IS</sub> and ROI <sub>PS</sub>			
	Yes/No	Statistical significance	Yes/No	Statistical significance		
Q <sub>2</sub> >Q <sub>1</sub>	Yes	/***	Yes	**/*		
Q <sub>3</sub> >Q <sub>1</sub>	Yes	*/***	Yes	***/*		
Q <sub>4</sub> >Q <sub>1</sub>	Yes	***/*	Yes	***/*		
Q <sub>3</sub> >Q <sub>2</sub>	Yes	/***	Yes	/***		
Q <sub>4</sub> >Q <sub>2</sub>	Yes	***/*	Yes	/***		
Q <sub>4</sub> >Q <sub>3</sub>	Yes	/	No	/		

Notes: Panel A presents the results of comparison of investment efficiency in companies for initial and post-issue shareholders. Diff NPV<sub>IS</sub> and NPV<sub>PS</sub> was calculated as the surplus of net present value for initial shareholders above net present value for post-issue shareholders divided by absolute value of net present value for initial shareholders. The same method was used to calculate differences between return on investment for the two groups of shareholders (Diff ROI<sub>IS</sub> and ROI<sub>PS</sub>). Companies are grouped according to quartiles of IPO success ratio. The one-way ANOVA and Kruskal–Wallis tests were used. *P*-values are presented in parentheses.

Panel B presents the results of range tests. Diff NPV<sub>IS</sub> and NPV<sub>PS</sub> and Diff ROI<sub>IS</sub> and ROI<sub>PS</sub> for each quartile pair are compared, Yes/No means that a relationship in Column One is confirmed/not confirmed. The *post hoc* Tukey test (the first indicator before slash) and non-parametric Kruskal–Wallis test (the second indicator after slash) were used. (\*), (\*\*), (\*\*\*) indicate that the differences are significant at 10, 5 and 1 per cent levels of significance, respectively.

shareholders. Profits generated by the raised capital are thus mostly acquired by the pre-IPO shareholders. We can also see (in Panel A of Table 7) that the value of the two measures comparing the efficiency of investment for pre- and post-IPO shareholders increases in subsequent quartiles of the IPO success ratio. Although the mean for Diff ROI<sub>IS</sub> and ROI<sub>PS</sub> in the fourth quartile is lower than in the third quartile, the median in this quartile is greater. We can infer that for companies with high IPO success, the efficiency of investment achieved by pre-IPO shareholders greatly exceeds the efficiency for post-IPO shareholders, whereas for companies with lower IPO success the differences between efficiency exist, but they are not so profound.

Both parametric and non-parametric test statistics for differences between the averages of the two measures across quartiles indicate that the differences are statistically significant. The results in Panel B of Table 7 point to particularly significant differences between lower and upper quartiles. In the case of Diff NPV<sub>IS</sub> and NPV<sub>PS</sub>, the most significant differences are observed between the fourth and first quartiles and the fourth and second quartiles, while for Diff ROI<sub>IS</sub> and ROI<sub>PS</sub> they are between the fourth and first quartiles and the third and first quartiles. The results support the view that for companies with the highest IPO success ratio, the differences between efficiency of investment for pre- and post-IPO shareholders are significantly higher compared to differences observed for companies with a lower IPO success ratio. The phenomenon

of value migration is therefore particularly high for companies with the highest IPO success.

## 8. Conclusions

Even though the Polish case appears as an anomaly compared to the other developed markets, it seems to be close to the whole emerging markets. WSE is one of the fastest-growing capital markets and the largest stock exchange in Central and Eastern Europe. Although it is mainly the place for Polish companies to raise capital, it is also a place for investors from around the world to invest. This suggests that some of our qualitative results on the performance of IPOs and the participation by both issuers and investors may extend to other emerging equity markets and will be important to investors from other countries.

Companies that go public to raise capital to finance their growth decide on the issuance of new shares; however, pre-IPO shareholders are not interested in selling too many rights to the share capital because it may lead to a loss of control over the company and limit future issuances. The best measure of success in raising equity capital is thus the percentage increase in shareholders' equity for each percentage of firm ownership sold during the IPO. One of the factors affecting the measure is the high valuation of shares above their nominal (par) value.

However, at the time of IPO, there is high information asymmetry between investors and issuers because companies going public are new to the stock market and, since investors know little about them, they are difficult to value. Therefore, in order to maximize their success, issuers must send signals to investors to indicate firm quality. In the economic literature, signalling theory is mostly used to clarify the differences in company performance. Such studies seek to separate high- and low-quality firms (Janney & Folta, 2006). At the time of IPO, the main driver of such signals is the prospectus. The information content of this document is regulated by law in many countries. Some information must be included in the prospectus, such as financial and accounting information. The law gives only general directions regarding the remaining information. In the part of the prospectus where the information content may be shaped by issuers, they tend to emphasize information that may be perceived by investors as a positive signal and reduce information that could be considered a negative signal. Obligatory information reaches the investors regardless of which signal it constitutes.

Our study confirms that mandatory financial and accounting information has a large impact on the valuation of the issued shares and thus on the success of the share issue. We found that this IPO success is most strongly determined by pre-IPO ROE. The signal sent by ROE is stronger than that sent by ROA, which gives the issuers more space for accounting manipulation (Teoh et al., 1998), because ROE is based on net profit that is more susceptible to manipulation than the operating profit usually used in ROA. This suggests that investors tend to believe that pre-IPO ROE is a signal of the future earnings potential of the IPO firm. The results also indicate that the size of the company is the second most important, but negative, factor determining IPO success, and it is not only impossible to hide but also easy for investors to spot. Investors earn the most in companies with strong growth potential. Lange, Bygrave, Nishimoto, Roedel, and Stock (2001) noted that investors readily accepted the mantra of 'growth at all costs'

during the Internet boom. Large companies are at the top of their life cycle, and therefore their growth potential is limited, which makes investors unwilling to entrust them with their capital. The third most important signal for IPO valuation that we identified is the WIG index reflecting investor optimism. The impact of investor optimism on the share valuation, and thus on issue success, is widely reported in the literature and explained on the basis of the timing theory. This means that companies willing to succeed on the WSE, as on other markets, should choose the best possible moment, when the market is bullish and investor optimism is widespread. Investors try to find companies that will invest the raised capital in the firm's development. In this context, the debt is also a positive signal because this may suggest that the company not only uses the possibility of obtaining low-cost capital but also really needs capital for development. Higher debt also means that the risk of investment is externally analysed and accepted, which may strengthen its positive influence on the success of the share issue.

Although pre-IPO ROE is the strongest signal for investors, determining their evaluation of the share issue, faith in the predictive power of this signal may turn out to have disastrous effects. In this article, we prove that companies with greater issue success due to the positive impact of pre-IPO ROE on investors' behaviours do not provide them with greater profitability after going public compared to companies with lower pre-IPO ROE, and consequently less successful issuance. Pre-IPO ROE is a poor predictor of post-IPO performance, considering both accounting and market measures of firm performance. Our study clearly shows that companies with high performance before IPO ensure higher success of issue; however, after IPO they do not achieve higher performance than companies with evidently lower efficiency ratios before IPO. After IPO, we do not observe statistically significant differences in both accounting and market measures of efficiency between companies with high and low success of IPO.

The use of pre-IPO profitability as a predictor of future performance efficiency is not only ineffective for investors but also leads to large-scale value migration between the initial and new shareholders. Initial shareholders selling, on average, 24.8% of shares in share capital raise their equity capital, on average, by 197%. Profits generated by the raised capital are therefore mostly acquired by the pre-IPO shareholders. In our research, we observed huge differences in investment efficiency measures for initial (before) IPO investors and for investors who bought new issues.

Investor belief in signals that are ineffective for their investments indicates that the investors probably use simple heuristics and have representativeness bias (Tversky & Kahneman, 1973, 1974) in assessing future profitability based on current profitability. In the complicated process of assessing new issues, investors tend to use the rule of thumb. The factors identified in the article that are seen as positive (ROE, leverage, investor optimism) or negative (company size) are signals easily observable by investors. Investors usually make their decisions on the basis of these easily available and popular parameters instead of thorough fundamental analyses.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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