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Performance of Polish IPO Firms: Size and Profitability Effect***

Summary: The study investigates the price behavior after initial public offerings (IPOs) listed on the Warsaw Stock Exchange from 2004 to 2009. It focuses on possible explanations for the IPO phenomenon within the context of Poland and provides evidence on the relation between both the company size and profitability and the aftermarket price performance.
The study aims to answer three questions. First, whether we could observe the short-term underpricing and the long-term underperformance of Polish IPOs, including the financial crisis period. Second, if the IPO anomalies did exist, whether they were distinct for the size and profitability subsamples. Finally, the change of the profitability was investigated for size subsamples from before to after going public.
A lower level of the underpricing and three-year underperformance was reported in comparison to the previous WSE studies. The pre-issue company size influences the IPO underpricing with the higher level of returns for smaller companies. Concerning the long-term performance, the opposite relation between size and buy-and-hold abnormal returns was found. It was also found that the higher the pre-issue profitability, the higher the underpricing. Large companies experience a better profitability improvement in the pre-IPO period with the profitability ratios getting worse not so rapidly after the flotation.

Keywords: initial public offering, event studies

JEL classification codes: G10, G11, G14, G30

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Introduction

Global issuing activity in initial public offerings (IPO) has attracted a lot of attention of security analysts and researchers over past decades. The previous studies mostly documented the first-day huge rise of the market prices in relation to the offer price which was described as the underpricing. Not so undisputable, but also very commonly discussed was the underperformance in the long run when prices sharply decrease. One of the possible explanations for the stock price performance after initial public offerings is the divergence of opinion hypothesis where the early over-optimistic expectations are gradually corrected over time in the aftermarket.

The paper has three main objectives. Firstly, we update the previous findings on the underpricing and underperformance of Polish IPOs. We observe short- and long-term IPO reaction to initial public offerings in Poland on the Warsaw Stock Exchange with a more contemporary sample than in previous studies. We also apply both a parametric and a non-parametric test to improve the properties of statistical tests.

Secondly, the research aims to search for possible sources of the short- and long-term price behavior. Here, we focus on the company size and the pre-IPO profitability as a proxy for stock returns in the aftermarket.

Last, the change of the profitability is investigated for size subsamples from before to after going public. It is to help to explain the changes in aftermarket company valuation of IPO firms and investigate the relation between the size and profitability in relation to the IPO initial underpricing and subsequent underperformance.

The rest of the paper is organized as follows. First, we review the previous studies. Then, we describe data and methodology issues and observe some of the characteristics of the sample companies. This is followed by an examination of the IPO short- and long-term abnormal performance. In the next two sections we report the effect of the issue size and profitability characteristics on the initial underpricing and long-run abnormal returns. Next, we discuss empirical results of the change in operating performance from before to after going public, with the last section summarizing the conclusions drawn.

Review of the literature

A vast number of empirical studies investigated the price behavior after initial public offerings. The papers concluded that IPOs generally tend to be underpriced in the short run and then underperform the benchmark for three up to five years after offering. It was first reported for US markets [Ibbotson, 1975], [Loughran, Ritter, 1995], [Rajan, Servaes, 1997], [Ritter, 1991]. Next, such price behavior was observed for non-US exchanges [Levis 1993], [Ljungqvist, 1997], also for emerging markets [Ghosh, 2005], [Lee, Kuo, Yen, 2011], [Lin, Lee, Lee, 2008].

The IPO process is especially susceptible to rapid changes in profitability ratios, with earnings management practices revealed especially around the issue time [Dechow, Sloan, Sweenney, 1995] or [Teoh, Welch, Wong, 1998]. It was partly because of the high level of information asymmetry around the issue. When the company is going public, investors usually know little about its financial situation. Security analysts are usually just beginning to cover the history of the firm. It is more easy for the management to manipulate the profit through some earnings management practices. Investors usually tend to believe that a better firm should also show a higher profitability. It inclines the management to engage in opportunistic behaviors and report higher earnings in the pre-offering period in order to encourage more favorable investment decisions around the issue.

One of the possible explanations for the poor stock price performance after the initial public offering is that security investors are at the beginning over--optimistic about the future situation of the issuer. According to the divergence of opinion hypothesis [Miller, 1977] some investors perceive the situation to be much better than others and are more prone to offer a higher price at the flotation time. This usually happens because of a high information asymmetry level around the issue. The uncertainty is supposed to decrease over time along with the divergence of opinion level. It results in the poor long-term price performance in comparison to the other companies for which the uncertainty has not changed so much.

The higher the asymmetry level about the company and the more uncertainty the security involves at the IPO time, the higher the underpricing and the more severe underperformance was expected [Brav, Gompers, 1997], [Bildik, Yilmaz, 2008], [Levis, 1993]. One of the proxies for the uncertainty level may be the around the issue company size.

Market investors and security analysts usually try to decrease the uncertainty level by observing company financial situation. In order to do it, they analyze certain financial ratios with the assumption that reported financial relations are reliable and able to reveal some information about the company real situation and prospects for the future. One of the most investigated group of financial ratios are the profitability measures. Investors usually hope that the company that has been able to get a higher profit for now will also be a profit--generating firm in the future, with the assumption that at last part of this success will influence the wealth of stockholders. That is why we focused also on the pre-IPO profitability as the possible explanation for the price behavior in the aftermarket. We expect the underpricing to be higher for highly profitable companies. The expectations about influence of the profitability on the long--term returns can be mixed. On the one hand, investors can believe that the better the company at the IPO time, the better it is supposed to be also in the post-IPO period. However, because many earnings management practices has been revealed in previous studies [Teoh, Welch, Wong, 1998], [Pastor-Llorca, Poveda-Fuentes, 2005], [Roosenboom et al., 2003], it is also possible that high

profitability at the IPO time might be at the artificially inflated level. Later on, when window-dressing techniques come to the light during the post-IPO period, the prices decrease.

Data, methodology and sample description

The main sample consists of 163 IPO transactions offered by non-financial firms from 2004 to 2009 on the Polish main stock market, the Warsaw Stock Exchange (WSE). The source for the IPO and the related data was Notoria Serwis, Ceduła and the offcial site of the WSE (http://www.gpw.pl/). The first step was to prepare the authors' own database of daily close prices for all companies listed on the WSE, as there has been no comprehensive database to exploit. Although it was a very time-consuming process, it was also essential since the existing sources do not include all of the necessary adjustments such as splits, preemptive rights and dividends. The database had also to be completed manually in order to include delisted firms.

The data for initial public offerings, information about stock prices, index values and financial statement information were not always uniform and comprehensive so some limitations had to be put in the research. In order to analyze the effect of the size and profitability on the short- and long-term IPO performance, the market and financial statement data had to be extracted also for all the other companies listed on the WSE for the period of 2002 to 2012.

In order to observe the effect of the size and profitability on the short- and long-term IPO performance, we defined two alternative measures for size and profitability. The size was first measured with the market value of equity at the end of the first quarter in the aftermarket (MVE). Then, it was expressed as the book value of total assets in the quarter before the public listing (BVA). The profitability was first expressed by the return on sales (ROS), which is defined as the net income divided by total sales revenues. Next, the operating return on total assets (ROA) was calculated as earnings before interest, tax and amortization divided by total assets.

Table 1. Database characteristics

	All firms			Small firms			Large firms		
	Mean	Median	N	Mean	Median	N	Mean	Median	N
Market value of equity, MVE (PLN mln)	924	107	162	97	68	87	1,883	329	75
Book value of assets, BVA (PLN mln)	1,291	66	163	35	30	86	2,695	258	77
Return on sales, ROS (%)	15.20	5.62	163	22.83	5.72	86	6.69	5.26	77
Return on assets,ROA (%)	3.89	3.11	163	4.19	3.86	86	3.56	2.96	77

Source: Authors' own.

Table 2. Sample distribution according to size and profitability

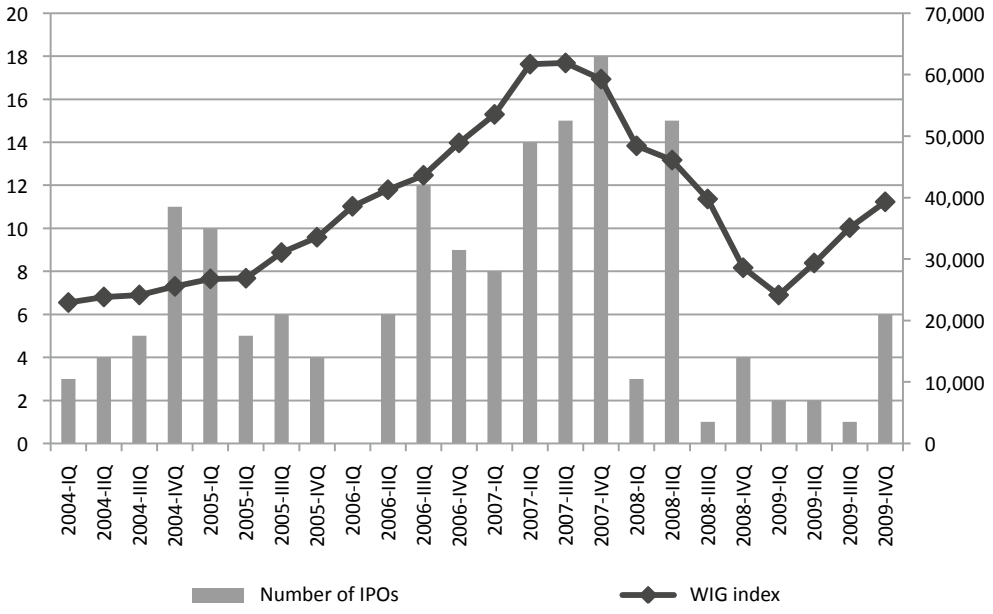
	All firms	Small firms	Large firms
Panel A: Size measured by market value of equity after issue (MVE)			
Low profitable, ROS (%)	41.36	30.25	11.11
High profitable, ROS (%)	58.64	34.57	24.07
Low profitable, operating ROA (%)	45.06	30.25	14.81
High profitable, operating ROA (%)	54.94	34.57	20.37
Panel B: Size measured by book value of assets before issue (BVA)			
Low profitable, ROS (%)	42.07	23.17	18.90
High profitable, ROS (%)	57.93	29.88	28.05
Low profitable, operating ROA (%)	45.12	21.34	23.78
High profitable, operating ROA (%)	54.88	31.71	23.17

Source: Authors' own.

Table 1 reports major characteristics of the IPO sample. The descriptive statistics are presented for the entire sample but the sample is also split up into small and large firms according to the book value of assets before the issue. The sample was divided into these groups using the size breakpoints based on median values calculated for the universe of the WSE companies. Then, each IPO firm was allocated into one of these two portfolios. The portfolio formation was repeated quarterly. Return on sales and operating return on assets were both calculated for the most recent quarter before the IPO date. The median market value of large firms is almost five times more than for small firms. The median book value of assets before offering for small firms was not more than twelve percent of the median for large firms. The median values of profitability ratios measured as well with the ROS as ROA were quite similar for both size subsamples. However, the mean profitability of firms that begin to quote on the WSE was much higher for small firms.

The average sample distribution is displayed in Table 2. The size and profitability were both measured in two ways. Each IPO firm was allocated into the size group according to the breakpoints calculated for the most recent quarter for all WSE companies (for assets) and for the last trading day of the quarter after IPO date (for capitalization). The same procedure was also repeated for profitability, using the most recent quarterly data at the IPO date. As a result, each IPO is characterized by its size (small and large companies) and the profitability (low and high) and belongs to one of the four groups of the WSE in the quarters from the sample period. Our results seem to support other studies that most firms go public when they are more profitable [Levis, 1993], [Loughran, Ritter, 1995].

Figure 1. IPO activity and the WIG index



Source: Authors' own.

Figure 1 plots the quarterly number of IPOs (the left axis) together with the mean quarterly WIG level (the right axis) during the period of January 2004 to December 2009. The peak of the IPO activity appeared in 2007, ending a period of the bull market. The financial crisis and a rapid change in the investor sentiment on equity markets were accompanied by a considerable drop in the IPO activity in 2008 and 2009.

The price performance of IPO firms in the aftermarket was observed in the short and long run. The research is based on close prices of securities. The IPO raw initial return is defined as the percentage change between the first-day closing market price of the IPO and the offer price, which was expressed as

$$\mathrm{IR} = \frac{\mathrm{P_{i,1}}}{\mathrm{P_i^{off}}} - 1,$$

where $\mathrm{P}_{i,1}$ is the aftermarket price for the first trading day for IPO i and P_i^{off} is the offer price for IPO i.

The initial adjusted return for IPO i was defined as follows:

$$\mathrm{IAR_{i,t}} = \mathrm{IR_{i,t}} - \mathrm{IR_{i,1}^{WIG}},$$

where $\mathrm{IR_{i,1}^{WIG}}$ is a market return (based on the main Warsaw Stock Exchange index, the WIG index) at the time of IPO i.

The raw return on security i in day t was defined as follows:

$$\mathrm{R_{i,t}} = \frac{\mathrm{P_{i,t+1}}}{\mathrm{P_{i,t}}} - 1,$$

where $P_{i,t}$ is a close aftermarket price for a day t, t means the number of days in the aftermarket, with $t = 1$ indicating the first trading day. Market returns are calculated similarly ($R_{i,t}^{WIG}$).

To measure the aftermarket IPO performance for longer periods, buy-and-hold returns are generated by compounding daily returns for each security and by compounding daily returns for the reference portfolio for the selected investment period. The buy-and-hold return for IPO i is defined as

$$BHR_{i,T} = \prod_{t=1}^{T}(1 + R_{i,t}) - 1,$$

where T is the aftermarket trading day number. It is assumed that a month, a quarter and a year are equivalent to 21, 63 and 252 trading days, respectively. The buy-and-hold return for the corresponding reference portfolio of IPO i is defined as:

$$BHR_{i,T}^{WIG} = \prod_{t=1}^{T}(1 + R_{i,t}^{WIG}) - 1.$$

In the next step, a buy-and-hold abnormal return for each IPO i is given by:

$$BHAR_{i,T} = BHR_{i,T} - BHR_{i,T}^{WIG}.$$

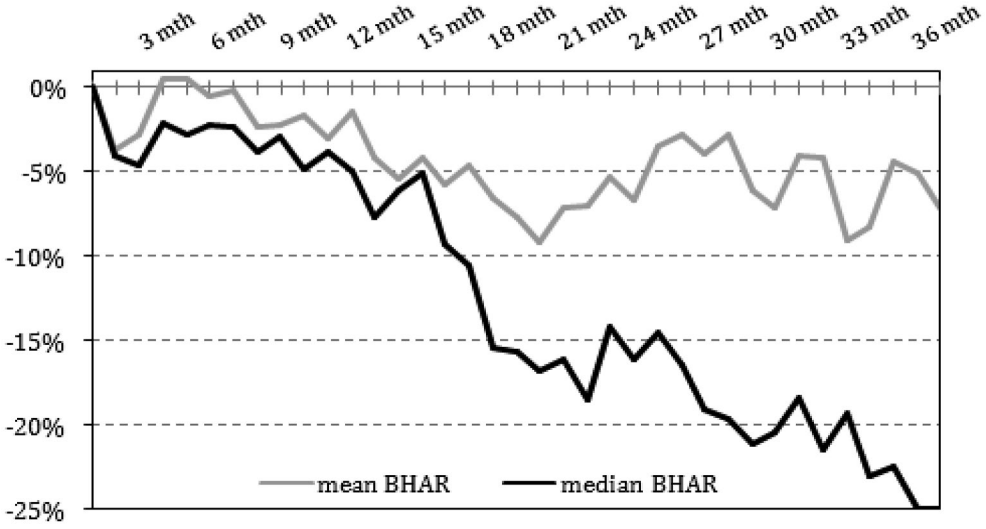
Final results are observed up to three years. Buy-and-hold returns are applied to simulate a real trading situation of an investment in securities at the flotation, holding it during a specified period of time and selling it afterwards. Buy-and-hold returns are used to account for the rebalancing bias, which arise when cumulative returns are employed. To minimize the potentially detrimental effect of extreme outliers, the literature is followed and the buy-and-hold returns for IPO i and the reference portfolio returns for the selected investment period were Winsorized at the three percent level. To be included in the final results of BHARs, the security was required to be listed up to the end of the selected investment period.

Kothari and Warner [1997], Barber and Lyon [1997] and Lyon et al. [1999] showed, that the conventional parametric t-test often confirmed a long-run abnormal performance when none was present. Because of that, the results of the parametric traditional t-test were presented along with the results of the nonparametric signed rank Wilcoxon test which was used to test the null hypothesis of no average abnormal long-term return for IPOs. The test results are presented according to the conventional confidence levels.

Buy-and-hold abnormal performance

This section offers a brief glance at the short and long run buy-and-hold abnormal returns of the WSE sample of IPO securities. Figure 2 shows the average (mean and median) abnormal compound return for the event sample up to the 36th month following the offering decision. It illustrates the change of the wealth for an investor that buys IPO securities on the floatation-day.

Figure 2. Average abnormal performance of IPOs



Source: Authors' own.

We observed how market-adjusted returns were negative during the analyzed period, except for the mean buy-and-hold abnormal returns for the third and fourth month. Median adjusted returns were negative during the whole three-year investment period with a sharp decrease after the first year. In particular, the mean (median) market-adjusted BHAR of Polish IPO firms was about –4.12 (–7.65) percent after the first year, –3.52 (–14.52) percent for the second year, and it dropped to –7.11 (–24.91) percent for the three-year investment period. Next, we tested the statistical significance of this abnormal performance. Both parametric and non-parametric test were involved. According to the results of the Wilcoxon signed rank test, the average returns were highly statistically significant.

The long-run buy-and hold returns (third anniversary of IPO) for the Polish stock market were reported to be much higher than in the previous studies. All of these results were for much earlier IPOs than ours or the market data covered the financial crisis period only in a very small extent. Aussenegg [2000] found the positive three-year WIG-adjusted buy-and-hold returns of 11.5 percent. Jelic and Briston [2003] as well as Lyn and Zychowicz [2003] found negative three-year BHAR of –37.8 percent and –24.4 percent, respectively, both not significant. In comparison, Jewartowski and Lizińska [2012] found the three--year market-adjusted buy-and-hold return of –22.62 percent.

Effect of the firm size on the short- and long-term returns

In this section we evaluate the relationship between the firm size and the IPO price performance, both in the short and long run. We observed the aftermarket performance in two steps. First, we checked if the underpricing and

the first-month returns were related to the size of the company going public. Second, we asked if there was a link between long-term returns and the IPO firm size. To address this, we defined the size as the book value of firm's assets for the most recent pre-issue quarter and as the market value of equity at the end of the first quarter in the aftermarket.

The short-term returns of Polish firms were measured in three ways. Firstly, the returns were defined as initial returns that refer the close price in the first day in the aftermarket to the offer price. In this way, we investigated the question what was the average return for an investor who purchased every IPO of the sample, issued at the offer price and sold it just after it was listed. The initial underpricing was observed in terms of raw (unadjusted) returns and market-adjusted returns. Third, the first month buy-and-hold abnormal return (BHAR) was measured as a difference between the buy-and-hold return for each IPO and the return on the corresponding market portfolio. Abnormal returns are compounded over the first month (21 trading days) after going public. Next, the long-term abnormal returns were calculated in a similar way to the first-month BHARs, with the assumption that each year equaled to 252 trading days.

The average underpricing and first-month returns for the sample partitioned on the basis of the IPO firm size are presented in Table 3. We report significant underpricing, for both raw and adjusted initial returns. It was equal to almost 11 percent with a median of almost 7 percent. All these values significantly differ from zero at the 1 percent confidence level for the traditional parametric *t*-test and the non-parametric Wilcoxon signed rank test. It is a lower level of first-day price appreciation in comparison to the previous studies. Jewartowski and Lizińska [2012] documented significant mean first-day underpricing of 13.95 percent. Aussenegg [2000], Jelic and Briston [2003] and Lyn and Zychowicz [2003] documented for earlier sample periods the IPO underpricing of 33.1 percent, 27.4 percent, and 54.4 percent respectively.

Table 3. Short-term returns on small and large IPO firms

	Mean (%)	p-value				Median (%)	N
		t-test		Wilcoxon test			
Panel A – Size measured by capitalization							
Raw initial returns							
All firms	10.98	0.0000	***	0.0000	***	6.94	149
Small firms	10.84	0.0000	***	0.0000	***	8.00	93
Large firms	11.44	0.0000	***	0.0000	***	5.63	55
Adjusted initial returns							
All firms	10.91	0.0000	***	0.0000	***	6.54	149
Small firms	10.83	0.0000	***	0.0000	***	6.55	93
Large firms	11.28	0.0000	***	0.0000	***	5.40	55

1st month BHARs							
All firms	–3.75	0.0002	***	0.0001	***	–4.08	147
Small firms	–6.36	0.0000	***	0.0000	***	–6.66	92
Large firms	0.03	0.9790		0.9732		0.14	50
Panel B – Size measured by book value of assets before issue							
Raw initial returns							
All firms	10.98	0.0000	***	0.0000	***	6.94	149
Small firms	12.18	0.0000	***	0.0000	***	9.44	75
Large firms	9.76	0.0000	***	0.0000	***	5.84	74
Adjusted initial returns							
All firms	10.91	0.0000	***	0.0000	***	6.54	149
Small firms	12.13	0.0000	***	0.0000	***	8.54	75
Large firms	9.68	0.0000	***	0.0000	***	5.35	74
1st month BHARs							
All firms	–3.75	0.0002	***	0.0001	***	–4.08	147
Small firms	–4.92	0.0018	**	0.0013	**	–6.32	75
Large firms	–2.07	0.0637	*	0.0540	*	–2.14	68

Notes: Statistical significance at the 1% (***), 5% (**) and 10% (*) confidence levels.
Source: Authors' own.

The first-day investor earned a higher mean return on larger IPO firms after the first 21 days after flotation. The conclusions of the analysis of the underpricing level differed according to the partitioning based on capitalization and assets. The short-term IPO studies based on the capitalization from just after the issue period indicated that mean and median underpricing were both higher for larger companies. It was consistent with some studies that indicated that large-capitalization firms are the ones that show higher initial underpricing [Álvarez-Otero, González-Mèndez, 2006]. However, our results also showed that companies with greater pre-issue value of assets experienced lower level of underpricing, both in terms of raw and adjusted initial returns. It was in line with the results of Ritter's work [1991] who showed that initial returns were lower for larger IPO firms.

The results of short-term returns showed the same pattern for all measures if subsamples were divided on the basis of the market value of equity at the end of the first quarter. Although the capitalization is a very commonly used measure for the company size in empirical finance (or the general uncertainty proxy of a firm), it should be applied very carefully as an IPO underpricing proxy because of the calculation method. It is not such a controversial issue in the long-run event studies when the capitalization from the short period after flotation conveys a quite different kind of information for long-run returns. The market value of equity is also quite common for short-term event studies in such cases as seasoned equity offerings where there is a possibility to retrieve the capitalization data from the pre-issue period to explain short-tem returns. But here, in the IPO case, it is impossible to apply it in a similar way.

For these reasons, we would recommend to treat the results of the short-term analysis for the asset-based division into IPO subsamples as the main findings. However, both division criteria (pre-IPO assets and post-IPO capitalization) can be of equal importance in the long run event studies.

Table 4. Long-term abnormal returns (BHARs) on small and large IPO firms

	Mean (%)	p-value				Median (%)	N
		t-test		Wilcoxon test			
Panel A – Size measured by capitalization							
1st Year							
All firms	–4.12	0.2450		0.0744	*	–7.65	145
Small firms	–5.89	0.1721		0.0867	*	–9.92	90
Large firms	–0.73	0.8986		0.5902		–4.00	49
2nd Year							
All firms	–3.52	0.5449		0.0117	**	–14.52	144
Small firms	–12.84	0.0467	**	0.0026	**	–17.40	90
Large firms	9.52	0.4324		0.6600		–13.66	49
3rd Year							
All firms	–7.11	0.3072		0.0086	**	–24.91	139
Small firms	–21.79	0.0008	***	0.0007	***	–26.72	88
Large firms	15.34	0.2738		0.8238		–12.41	46
Panel B – Size measured by book value of assets before issue							
1st Year							
All firms	–4.12	0.2450		0.0744	*	–7.65	145
Small firms	–3.50	0.4515		0.1891		–5.69	75
Large firms	–2.01	0.6824		0.5398		–5.54	66
2nd Year							
All firms	–3.52	0.5449		0.0117	**	–14.52	144
Small firms	–9.75	0.1699		0.0127	**	–17.17	77
Large firms	–3.05	0.7423		0.0786	*	–14.68	65
3rd Year							
All firms	–7.11	0.3072		0.0086	**	–24.91	139
Small firms	–16.77	0.0168	**	0.0113	**	–25.13	74
Large firms	–2.12	0.8432		0.1982		–18.61	63

Notes: Statistical significance at the 1% (***), 5% (**) and 10% (*) confidence levels.
Source: Authors' own.

According to the results in Table 4, we observed that the long-term post--issue returns based on the buy-and-hold strategy were higher for larger companies and they faced a smaller underperformance, regardless of the criterion used. It was consistent with most of the previous studies. However, the results are not always statistically significant. Such relation was also in line with the expectations and empirical results indicating that smaller companies are also

supposed to be the weaker ones with lower returns in the consequence [Brav, Gompers, 1997], [Bildik, Yilmaz, 2008], [Levis, 1993].

Effect of firm profitability on aftermarket performance

We measure thed short-term reaction to Polish initial public offerings for profitability-based subsamples by applying raw and adjusted initial returns and first-month abnormal buy-and-hold returns in the same way as described in the section above (Table 5). The same holds for the long-term abnormal compound returns that were measured to quantify the adjusted return experienced by an investor in the years following the IPO event (Table 6).

Table 5. Short-term returns on low and high profitable IPO firms

	Mean (%)	p-value				Median (%)	N
		t-test		Wilcoxon test			
Panel A – Profitability measured by return on sales							
Raw initial returns							
All firms	10.98	0.0000	***	0.0000	***	6.94	149
Low profitable firms	9.15	0.0000	***	0.0004	***	5.08	68
High profitable firms	12.51	0.0000	***	0.0000	***	10.94	81
Adjusted initial returns							
All firms	10.91	0.0000	***	0.0000	***	6.54	149
Low profitable firms	9.10	0.0000	***	0.0004	***	4.86	68
High profitable firms	12.43	0.0000	***	0.0000	***	10.55	81
1st month BHARs							
All firms	–3.75	0.0002	***	0.0001	***	–4.08	147
Low profitable firms	–6.69	0.0000	***	0.0000	***	–6.57	65
High profitable firms	–1.84	0.1900		0.1599		–1.76	77
Panel B – Profitability measured by operating return on assets							
Raw initial returns							
All firms	10.98	0.0000	***	0.0000	***	6.94	149
Low profitable firms	9.10	0.0000	***	0.0001	***	6.00	67
High profitable firms	12.51	0.0000	***	0.0000	***	10.79	82
Adjusted initial returns							
All firms	10.91	0.0000	***	0.0000	***	6.54	149
Low profitable firms	8.92	0.0000	***	0.0002	***	5.39	67
High profitable firms	12.53	0.0000	***	0.0000	***	10.72	82
1st month BHARs							
All firms	–3.75	0.0002	***	0.0001	***	–4.08	147
Low profitable firms	–6.62	0.0000	***	0.0001	***	–6.39	64
High profitable firms	–2.68	0.0449	**	0.0338	**	–3.49	79

Notes: Statistical significance at the 1% (***) and 5% (**) confidence levels.
Source: Authors' own.

The IPO sample was split up into two groups, with low and high profitability, with results for two profitability measures. The profitability was first expressed as the return on sales and defined as the net income divided by total sales revenues. Second, the operating return on total assets was calculated as earnings before interest, tax and amortization divided by total assets.

Focusing on Table 5, we can observe that the short term returns were much higher for more profitable firms, both for mean and median values. It was confirmed as well for the ROS- as for ROA-based subsamples. The average results for the groups are mostly significant. It seems that investors did seem to believe that a company with a higher profitability was also the better to invest in. Investing in highly profitable Polish IPO firms at the offer was likely to be a return-maximizing strategy, at least in terms of mean and median values in the sample period.

Table 6. Long-term abnormal returns (BHARs) on low and high profitable IPO firms

	Mean (%)	p-value			Median (%)	N
		t-test	Wilcoxon test			
Panel A – Profitability measured by return on sales						
1st Year						
All firms	–4.12	0.2450	0.0744	*	–7.65	145
Low profitable firms	–2.75	0.6079	0.4369		–9.11	64
High profitable firms	–5.37	0.2517	0.1833		–5.08	77
2nd Year						
All firms	–3.52	0.5449	0.0117	**	–14.52	144
Low profitable firms	–5.37	0.5289	0.0484	**	–16.05	64
High profitable firms	–10.25	0.1396	0.0196	**	–14.68	77
3rd Year						
All firms	–7.11	0.3072	0.0086	**	–24.91	139
Low profitable firms	–9.52	0.2704	0.0538	*	–23.37	62
High profitable firms	–9.91	0.2811	0.0547	*	–25.02	74
Panel A – Profitability measured by operating return on assets						
1st Year						
All firms	–4.12	0.2450	0.0744	*	–7.65	145
Low profitable firms	–5.42	0.3413	0.2225		–15.25	63
High profitable firms	–3.15	0.4985	0.3262		–3.25	80
2nd Year						
All firms	–3.52	0.5449	0.0117	**	–14.52	144
Low profitable firms	–9.75	0.9984	0.1302	**	–17.17	77
High profitable firms	–3.05	0.3457	0.0358	*	–14.68	65
3rd Year						
All firms	–7.11	0.3072	0.0086	**	–24.91	139
Low profitable firms	–4.13	0.7343	0.0482	**	–26.37	60
High profitable firms	–7.01	0.3788	0.1374		–16.16	76

Notes: Statistical significance at the 5% (**) and 10% (*) confidence levels.
Source: Authors' own.

If we move to Table 6, we can observe the long-term IPO performance for the profitability-based subsamples. Here, the results were not so conclusive as for the first-days market reaction. Although the mean abnormal buy-and-hold return for IPOs with high return on sales was lower, the results were not statistically significant using the *t*-test. The Wilcoxon signed rank test did not always allow to reject the null hypothesis. The median results for the ROS-based subsamples and mean and median results for the ROA-based groups did not show one pattern and it was hard to come to irrefutable conclusions. The inconclusive results for the relation between profitability and long-term returns inclined to discuss the company profit changes and the stock price underperformance in the years following the offering decision in the context of earnings management practices. We believed this should shed more on the explanation for the poor long-term performance of stock returns.

IPO firms' operating performance and size

The difference in operating performance tendencies of IPO firms was observed for two different profitability measures for each company. On the one hand, we used the return on sales (ROS), which related the net income to total sales revenues. On the other hand, the profitability was defined as the operating return on total assets (ROA) and it was calculated as earnings before interest, tax and amortization divided by total assets. The measures were calculated quarterly. Then, the percentage change in each ratio was observed as the difference between the values for the quarters from –6 before IPO (Q-6) up to +8 after going public (Q+8), with the quarter 0 (Q0) indicating the quarter in which the equity was offered for security *i*. The average change in each ratio was calculated under the assumption that outliers were eliminated from each subsample so that the ratios were finally between the 3^{rd} and 97^{th} percentiles, respectively.

Table 7 shows the average change in return on sales and return on assets both before and after going public. The results are presented as well for all events as for the size subsamples. In the second case, the sample is split up into small and large firms according to the book value of company assets in the quarter before going public.

The mean (median) operating performance measured with the return on sales rose by almost 5 (12.21) percent in quarter –2 relative to the year before that (Q-6). The division into subsamples according to the size showed that the rise was especially observed for large IPO firms. The mean (median) ROS rise equaled to 9.33 (12.81) percent for large firms in comparison to ROS change of 0.71 (11.11) percent for small companies. The increase in profitability ratio was even more evident when we observed the results for the operating return on assets. The mean (median) increase for the quarter Q-2 relative to quarter Q-6 before IPO equaled to almost 32 (15) percent. The division into small and large companies showed the same pattern as for return on sales, as the

ROA rise for large companies was three times higher than for small IPO firms (49.25 versus 16.43 percent) and the change in median values was even more evident (22.64 versus 2.02 percent).

Table 7. Average quarterly change of profitability of IPO firms according to the company size

	Q-2/Q-6	Q+4/Q0	Q+8/Q+4	Q+8/Q-2
Panel A Profitability measured by return on sales (ROS)				
All firms				
Mean change (%)	4.76	–39.26	–46.45	–48.91
Median change (%)	12.21	–21.75	–29.87	–50.25
N	151	153	153	153
Small firms				
Mean change (%)	0.71	–47.84	–87.34	–83.57
Median change (%)	11.11	–38.05	–41.89	–80.95
N	80	80	80	80
Large firms				
Mean change (%)	9.33	–30.11	–1.64	–8.87
Median change (%)	12.81	–2.38	–19.33	–18.28
N	71	74	73	71
Panel B Profitability measured by operating return on assets (ROA)				
All firms				
Mean change (%)	31.98	–16.01	–27.15	–58.37
Median change (%)	14.90	–20.83	–24.00	–60.65
N	152	151	150	150
Small firms				
Mean change (%)	16.43	–35.78	–44.00	–78.03
Median change (%)	2.02	–37.06	–32.29	–77.74
N	80	78	78	81
Large firms				
Mean change (%)	49.25	5.11	–8.88	–35.30
Median change (%)	22.64	–3.39	–15.25	–43.98
N	72	73	72	69

Source: Authors' own.

According to the results shown in the last three columns of Table 3, there existed the relationship between the firm's size and the change in profitability also after the IPO date. Interestingly, when the positive change in profitability seems to be more evident for large firms in the pre-IPO period, the large firms are also those companies for which the decline in profitability in the post-offering period was reported to be not so rapid. The difference for size--subsamples was really huge as the mean (median) return on sales dropped by 83.57 (80.95) percent for small firms whereas the fall for large firms was much

lower with the mean (median) equaled to 8.87 (18.28 percent). The difference between small and large IPO firms was not so big in terms of the return on assets. If we compared the change in ROA for the second year after IPO (Q+8) with the corresponding values from the pre-IPO period (Q-2), we reported the mean (median) profitability fall for small and large IPO-firms totaling to 78.03 (77.74) and 35.3 (43.98), respectively.

The evidence indicated that it was the larger Polish companies that experienced a more pronounced improvement in profitability ratios in the pre-IPO period. Besides, it was confirmed that the profitability of bigger firms in comparison to smaller firms was getting worse not so rapidly in the years following the flotation.

Conclusions

During the period from 2004 to 2009 there was a time of hot and cold markets, with the fluctuating IPO activity. The phenomenon of the short-term underpricing and the long-term underperformance of Polish IPOs was readdressed in the present study for the Warsaw Stock Exchange during the crisis years. Even though the problem has been extensively investigated in the previous studies, it still awaits explanation, especially for emerging markets. Our analysis is based on a unique hand-collected database of Polish IPOs and market data.

The study allowed to investigate three main research areas. First, whether we could observe the underpricing and the long-term underperformance in Polish IPOs, including the financial crisis period. Second, if the IPO anomalies did exist, whether they were distinct for the size and profitability subsamples. Finally, the change of the profitability was investigated for size subsamples from before to after going public.

The previous findings on the post-IPO market prices reaction were updated. The present study documented a lower level of underpricing and underperformance in comparison to the previous studies for the Warsaw Stock Exchange. The average first-day return was equal to 10.98 percent. Focusing on the three-year performance, an investor purchasing each IPO on the first day in the aftermarket would have earned a mean (median) abnormal return of –7.11 (–24.91) percent. The changing level of short- and long-term returns and the fact that the main development of the Polish equity market occurred rather recently make it difficult to explain the reasons for the aftermarket price performance.

The pre-issue company size influenced the IPO underpricing. It resulted with the higher level of initial returns for companies with relatively small pre-issue assets. Concerning the long-term performance, the opposite relation between size and buy-and-hold abnormal returns seemed to be found. It was also observed that the higher the pre-issue profitability, the higher the under-

pricing. No undisputable evidence was found for the fact that the pre-issue profitability level related to the long-term adjusted returns.

Next, the conclusion that the operating profitability changes in the pre- and post-IPO period differed according to the company size seemed to be appropriate. The evidence showed that large companies experienced a better profitability improvement in the pre-IPO period with the profitability ratios getting worse not so rapidly after the flotation as in the small-size IPO case. Smaller companies experienced inferior profitability ratios to the larger companies in the pre-issue period and they also seemed to be more volatile to negative changes in the profitability after flotation.

However, the results should be interpreted with a caution since the sample was rather small and the period under review was very specific. It encompassed the bull and bear market with a huge rise and a sudden fall in the IPO activity along with unexpected events and shocks on stock markets worldwide.

The question that remains unresolved is the generality of the empirical results. The Polish equity market is still a young one. Although it has been in the European forefront in terms of the IPO activity, the universe of companies is still not huge and the sample period, especially for the cross-sectional analysis, is still rather limited for a detailed research.

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KONDYCJA FINANSOWA SPÓŁEK DOKONUJĄCYCH IPO: ZNACZENIE WIELKOŚCI I ZYSKOWNOŚCI

Streszczenie

Celem opracowania było zbadanie trzech kwestii. Po pierwsze, czy na polskim rynku, również w okresie kryzysu finansowego, zaobserwować można było krótkoterminowy underpricing i długookresowe przewartościowanie. Ponadto, jeżeli takie anomalie znajdują potwierdzenie, to czy poziom stóp zwrotu był odmienny dla grup zróżnicowanych pod względem wielkości i zyskowności spółki. Po trzecie, obserwowano również zmianę zyskowności w okresie przed i po emisji.

Badania obejmowały problematykę reakcji cenowej na skutek dokonania pierwotnych emisji akcji (IPO) przez spółki notowane na Giełdzie Papierów Wartościowych w Warszawie w okresie 2004–2009. Koncentrowały się na determinantach zjawiska na polskim rynku i relacji pomiędzy stopami zwrotu a wielkością spółki i jej zyskownością.

Stwierdzono niższy poziom underpricingu i przewartościowywania w porównaniu z dotychczasowymi badaniami. Dla większych spółek dokonujących emisji odnotowano niższe krótkoterminowe i wyższe długoterminowe stopy zwrotu. Spółki bardziej rentowne przed emisją cechowały się wyższym poziomem underpricingu. Poprawa wskaźników rentowności przed emisją była bardziej znacząca dla większych spółek, również przy mniej gwałtownym spadku ich zyskowności po wejściu na giełdę.

Słowa kluczowe: pierwotne emisje akcji, analiza zdarzeń.

Kody JEL: G10, G11, G14, G30.