

A NEW APPROACH TO UNDERPRICING PHENOMENON IN POLAND

Dorota Podedworna-Tarnowska*



<https://doi.org/10.18778/2391-6478.S2.2023.06>

A NEW APPROACH TO UNDERPRICING PHENOMENON IN POLAND

ABSTRACT

The purpose of the article/hypothesis. The purpose of the article is to identify and assess the underpricing of initial public offerings in Poland on the regulated and alternative markets, considering the division of total underpricing into primary underpricing and secondary underpricing. The study also takes into account different types of IPOs (cold, neutral and hot). Such an approach to measuring underpricing based on the data coming from both the regulated market of the Warsaw Stock Exchange and the alternative market – NewConnect, is pioneering on the Polish market.

Methodology. The statistical analysis covers 271 companies debuting on the regulated market of the Warsaw Stock Exchange between 2005 and 2022 and 585 companies debuting on the alternative market between 2007 and 2022. Total underpricing was divided into primary underpricing and secondary underpricing. All IPOs were split into cold, hot, and neutral offerings according to the secondary underpricing. T-tests for estimating the significance of the rate of returns were conducted for both the regulated and alternative markets. The correlations were estimated using Pearson's index.

Results of the research. The results of the analysis show that in Poland, the IPO underpricing occurring on the primary market is significantly positive, representing the remuneration of subscribers for participating in the initial public offering. Moreover, it is higher for an IPO on the alternative market than on the regulated market. In contrast, returns calculated from opening prices to closing prices on the first day of trading are negative in both markets, with lower returns in the NewConnect market. The average primary underpricing for cold IPOs is higher than for hot IPOs for both the regulated and alternative markets. Average secondary underpricing is negative for cold IPOs and positive for hot IPOs on both the regulated market and NewConnect.

* Dr, Szkoła Główna Handlowa w Warszawie, e-mail: dpoded@sgh.waw.pl, <https://orcid.org/0000-0001-5945-403X>

Furthermore, there is a significant positive correlation between primary and total underpricing regardless the hotness of the IPOs and a positive significant correlation between primary and secondary underpricing occurs only for hot offers while for cold offers it is negative.

Keywords: initial public offering (IPO), total underpricing, primary underpricing, secondary underpricing.

JEL Class: G12; G14; G24; G32.

INTRODUCTION

Listing a company on a stock exchange and offering its shares to investors in an initial public offering involves a complex and specific process for determining the company's valuation and setting the allotment stock price. Although the valuation is based on fundamental analysis, as a result of roadshows and various price negotiations, the price is an expression of the compromise between the IPO participants, i.e., shareholders, the issuer, and potential investors. However, the verifier of this valuation is the market, where demand and supply for a given stock are the result of both rationales supported by an analysis of the company's fundamentals and behavioral factors, such as general investment sentiment or speculative motives.

As Bhagat et al. [2018: 108–145] state, an IPO gives participants in the public capital market their first chance to evaluate a collection of corporate assets and expansion potential. The IPO valuation is very important since it gives managers of such enterprises their first chance to monitor price signals from the public capital markets which can confirm or refute management's assumptions about the company's potential for future growth. As a result, it helps them to make decisions relating to choosing the directions of development, such as, inter alia, employment or corporate investment.

When companies go public, shares sold in an IPO are usually offered at a lower price than the price implied by the fundamental valuation. This results in a significant price jump on the first day of a company's listing on the stock exchange as the market value is determined by the connection between share supply and demand. Such a phenomenon is virtually observed on every stock exchange around the world. The IPO underpricing phenomenon is also described as the "rent" that is distributed by the underwriter to the initial purchasers of shares [McDonald and Fisher 1972: 97–102], "money left on the table" [Ritter 1984: 215–240; Ljungqvist 2007: 375–422], the immediate loss to the initial owner [Allen and Faulhaber 1989: 303–324], the indirect cost of the offering [Ritter 1987: 269–281], the opportunity cost caused by the transfer of value to new buyers of shares [Puławski 2013: 435–447], or even "burning money" [Gale and Stiglitz 1989: 469–477].

The dominant approach in the literature and in practice to assess this phenomenon is to measure the so-called raw immediate return, calculated using the return from the offering price to the closing price on the first day of trading. This measurement does not provide clear information who the beneficiaries of underpricing are. In addition, closing prices can be contaminated by the reactions of investors and market makers. Furthermore, past investigation rarely looked at underpricing from the perspective of investors on the secondary market whose decisions shape the share prices. As a contradiction to the efficient market hypothesis Miller [1977: 1151–1168] pointed out that the presence of a substantial number of well-informed investors will prevent them from being substantially undervalued securities, but there may be securities whose prices have been bid up to excessive levels by a badly informed minority. Miller and Reilly [1987: 33–38] argued that it is market mispricing during the first day of trading that causes excess returns not to be available to investors in the secondary market. On the other hand, IPO is usually associated with large investor interest, which shapes the behavior of other market participants. According to Aggarwal [2000: 1075–1103, 2003: 111–135] the trading volume on the first day or two following an IPO is enormous, equivalent to over 70% of the shares sold in the IPO. According to Ellis et al. [2000: 1039–1074] in IPOs traded strictly above the offer price they are more than double that of the other IPOs. Consequently, the actions of short-term investors who want to realize profits as quickly as possible create a significant increase in the supply of these stocks, causing inevitable downward pressure on the price. According to Mąka [2008: 19–31], the concentration of such phenomena in a relatively short period can cause a kind of “domino effect” on psychological grounds and lead to the depreciation of shares which does not reflect real economic factors. Welch [1992] described such “positive cascades” in which subsequent potential investors ignoring their private information can learn from the purchasing decisions of earlier investors and consequently imitate them.

Therefore, it is sometimes postulated that opening prices should also be included in the calculation of underpricing. There are few studies in the literature focusing on returns in IPO covering the period from allocation to opening and from opening to closing. Among them there are studies by Aggarwal and Conroy [2000: 2903–2922], Aggarwal et al. [2002: 105–137], Schultz and Zaman [1994: 199–219], Bradley et al. [2009: 316–330], Chan [2010: 1475–1495], Chang et al. [2008: 1–16], Acedo-Ramírez and Ruiz-Cabestre [2014: 71–97; 2019: 134–159], Bhagat et al. [2018: 108–145], Perera and Kulendran [2016: 99–108]. Moreover, hot and cold IPOs are distinguished in measuring underpricing. However, there are different approaches to defining them in the literature. They can be based either on IPO returns, on value or on another feature. In the light of the aspects presented, an interesting research issue is the analysis of the relationship between

primary, secondary and total underpricing, and especially depending on the type of IPO. The intention of this research is to examine who the major beneficiaries of underpricing are and whether investors follow the behaviors of preceding investors creating cascades.

The purpose of this article is to identify and assess the underpricing of initial public offerings in Poland on the regulated and alternative markets, considering the division of total underpricing into primary underpricing and secondary underpricing. This study using such an approach to measuring underpricing based on the data coming from both the regulated market of the Warsaw Stock Exchange and the alternative market – NewConnect, is pioneering on the Polish market. Thus, it contributes to expanding the international scope of empirical research on the underpricing phenomenon in IPO.

The subsequent part of the article is organized as follows. The literature review concerning both primary and secondary underpricing approach and the issue of measuring the hotness of the IPO market is presented in section 1 together with the hypothesis development. Section 2 contains the description of the research method and data selection. Section 3 is devoted to presenting the results of the research. The conclusions are included in the last section.

1. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

1.1. Primary and secondary underpricing

The level of underpricing was the subject of numerous studies. It varies depending on the period of the study, the research sample, and the development of the capital market. Several studies of underpricing concern especially the US market [Ritter 1984: 215–240; Ljungqvist 2007: 375–422; Ibbotson et al. 1988: 37–45; Ibbotson et al. 1994: 66–74; Loughran and Ritter 2004: 5–37; Ritter and Welch 2002: 1795–1828]. However, relatively often this phenomenon is studied in other markets, e.g., Sweden [Rydqvist and Hogholm 1995: 287–315], Germany [Ljungqvist 1997: 1309–1320], France [Derrien 2005: 487–521], China [Chan et al. 2004: 409–430], Canada [Johan 2010: 128–144]. In the Polish market, such research has been conducted, among others, by Siwek [2005], Mizerka and Lizinska [2017], Sieradzki [2016] Zarzecki and Wołoszyn [2013: 121–135], Lizińska and Czapiewski [2014: 53–71; 2015: 112–125], Pomykalski and Domagalski [2015: 117–132], Podedworna-Tarnowska, [2022: 135–160]. An overview of underpricing ratios for different countries and different periods can be found in Loughran et al. [1994: 165–199], Ritter [2003: 421–434], and on Ritter's website (<https://site.warrington.ufl.edu/ritter/files/International.pdf>).

The phenomenon of underpricing is mostly investigated in regulated markets [e.g., Ritter 1984: 215–240; Ljungqvist 2007; Loughran and Ritter 2004; Ritter and Welch 2002; Siwek 2005; Sukacz 2005; Mizerka and Lizińska 2017; Sieradzki 2016; Zarzecki and Wołoszyn 2013: 121–135; 2016; Lizińska and Czapiewski 2014: 53–71; 2015: 112–125; Pomykalski and Domagalski 2015: 117–132; Podedworna-Tarnowska 2022: 135–160]. Underpricing in alternative markets is studied relatively less frequently [Vismara et al. 2012: 352–388; Hadro and Pauka 2019: 87–94; Podedworna-Tarnowska 2020: 267–281].

The first empirical studies of underpricing described in the literature, dating back to the 1970s, were based on semi-annual data [Stoll and Curley 1970: 309–322], or monthly [Ibbotson 1975: 1027–1042], weekly [McDonald and Fisher 1972: 97–102; Neuberger and Hammond 1974: 165–177], as well as with reference to a specific day after issuance, for example, the first or fourth Friday after issuance [Reilly and Hatfield 1969: 73–80; Reilly 1973: 83–90] or the first or fourth Wednesday after issuance [Reilly 1977: 28–42], then another from the 1980s already concerned observations of returns calculated for a single day's quotation data [Ritter 1984: 215–240; Ibbotson et al. 1988: 37–45]. This way of calculating simple returns on IPOs has become predominant in the literature on the issue of underpricing. Only in a few studies, the relationship between the offering price and the initial secondary market price was used to assess the effectiveness of pricing new issues [Stoll and Curley 1970: 309–322; Bear and Curley 1975: 311–325]. Also, Barry and Jennings [1993: 54–63] proposed to narrow the time horizon for underpricing calculations, dividing first-day returns into opening price returns and intraday returns. The use of two return measures in the estimations made it possible to identify underpricing in the primary market calculated from the ratio of the opening price on the first day of trading and the offer price and underpricing in the secondary market calculated from the ratio of the opening price and the closing price on the first day of trading – the so-called intraday rate of return.

The relationship between rates of return can be expressed by the following formula:

$$(1 + R_T) = (1 + R_P) \times (1 + R_S)$$

Where:

R_T – the total initial returns;

R_P – initial returns on the primary market; primary underpricing;

R_S – initial returns in the secondary market; secondary underpricing.

This relationship can also be shown graphically (Figure 1).

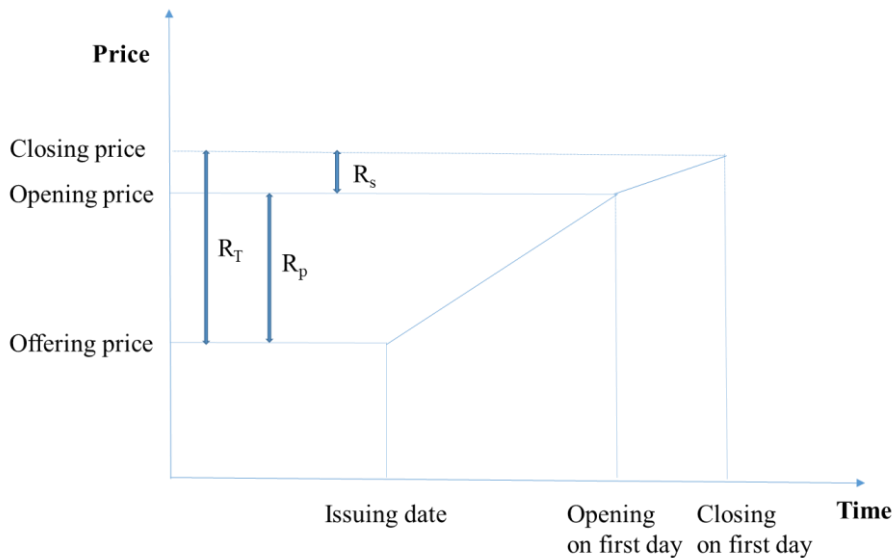


Figure 1. The relationship between rates of return in IPO

Source: Chang et al. 2008: 1–16.

Barry and Jennings [1993: 54–63] observed a significant volume of trading in the secondary market on the first day of trading (in some cases reaching up to 100% of the size of the offering, and in extreme cases even exceeding the value of the offering) and suggested that part of the profits of investors in IPOs may accrue to those who buy the offering in the secondary market, rather than in the offering itself. However, they observed about 90% of the average return for the day obtained from the opening transaction and therefore in the primary market (the average return calculated from the offering price and the closing price was 6.78%; the average rate of return calculated from the offer price and the opening price was 6.16%). At the same time, the returns on the secondary market on the first day from opening to closing for IPOs are only 60 basis points (the average rate calculated from the opening price and the closing price was only 0.60%). The results of these studies show that the benefits of underpricing accrue almost entirely to subscribers. Since, in principle, only those original buyers in the offering benefit from underpricing the IPO, this justifies the conclusion that underpricing is a tool for rewarding those who participate in the offering. At the same time, they showed the lack of correlation between the opening returns and the intraday returns suggesting that IPO secondary market transactions are not characterized by information cascades that extend beyond the opening of the listing. Aggrawal and Conroy [2000: 2903–2922] investigated the “offering-to-opening” return,

focusing on the IPO price disclosure process in the pre-opening period. The first quote provided by the lead underwriter in the pre-opening period explains a large percentage of the initial return, which is about 1.54% from opening to closing in their sample. Schultz and Zaman [1994: 199–219] showed a positive opening-to-closing return of 3% in a sample of 72 IPOs dating back to 1992, with almost all of the returns in their study occurring within the first ten minutes of secondary market trading.

Bradley et al. [2009: 316–330] showed that on average, IPOs gained 2.3% from opening to closing on the first day of trading. In addition, the opening-to-closing return after the bubble period is approximately one-fifth of the total underpricing, which is more than double the percentage observed during the bubble period. Perera and Kulendran [2016: 99–108] showed that Australian IPOs were underpriced by 26.43% on raw returns on the first-day primary market. However, they were overpriced by 1.54% on the secondary market. Contrary, Chang et al. [2008: 1–16] based on offers that took place in the Chinese market showed that the initial abnormal rate of return in the secondary market is significantly positive. This initial rate of return in the secondary market is positively related to the market rate of return, and negatively related to the offer price and offer size. At the same time, they show high initial turnover along with high initial returns in the secondary market, with initial turnover having no effect on the initial return rate in the secondary market, but the initial return rate in the secondary market has a significantly positive effect on initial turnover. This indicates high speculation in the Chinese IPO market. Acedo-Ramírez and Ruiz-Cabestre [2014: 71–97] confirmed that the underpricing does not go beyond the first trading day and that the intraday or secondary (open-to-close) return is significantly positive. They proved that the influence of the primary market over the secondary price formation process on the first trading day is quite evident.

Based on the literature presented, the intention is to examine who the major beneficiaries of underpricing are, both in the regulated and in the alternative markets, therefore, the following hypothesis was posed:

H.1 The first-day return is mainly realized as a result of opening rather than closing transactions.

1.2. The hotness of the IPO market

In the literature, hot and cold IPO markets are defined differently, eg., based either on IPO returns, on the value of IPO, on the volume of IPO or on another feature. For instance, Lowry [2003: 3–40] used a number of firms that went public during the current quarter divided by the total number of public firms at the end of the previous quarter. Helwege and Liang [2004: 541–569] defined it based on the total

number of IPOs completed per month. Chan [2010: 1475–1495] used the definition of volume divided by tercile into hot cold and neutral according to the number of IPOs in three consecutive months, which have a three-month centered moving average of the number of IPOs scaled by the total number of listed companies. Dudycz and Brycz [2017: 61–89] defined hot and cold periods based on annual IPO volume, identifying hot periods as years in which IPO volume is higher than the median IPO volume during the study period, while cold markets are those in which that volume is lower than the median. Hot markets are also characterized by the number of IPOs in the most dominant industry groups [Helwege and Liang 2004: 541–569; Stoughton et al. 2001: 375–408].

Most approaches define the hotness according to rates of return as a period is hot if the average underpricing in a given period is unusually high. According to Ibbotson and Jaffe [1975: 1027–1042] and Loughran and Ritter [2002: 413–443], a hot issue market is defined as a month in which the average first-day return is above the median month's average first-day return. Helwege and Liang [2004: 541–569] used the definition of the firm itself having strong or weak underpricing: they used the following cutoffs: hot – the top quartile of the sample with an underpricing of at least 25% and a cold IPO is defined as one with a return of 0.8% or less (including many negative and zero returns). Ellis [2006: 339–363] divided the research sample into quartiles based on initial returns and created four groups with underpricing cutoff level: cold IPOs are defined as having underpricing of zero or below, cool IPOs having underpricing of 0–5.9%, warm IPOs having underpricing ranging from 5.9% to 17.5% and extra-hot IPOs defined as having underpricing greater than 17.5%. Bradley et al. [2009: 316–330] classified IPO as “hot” if its offer-to-open return is in the top quartile of all offer-to-open returns and IPO classified as “cold” if its offer-to-open return is in the bottom quartile of all offer-to-open returns. Ellis et al. [2000: 339–363] created subsamples based on the price traded in the first 20 days: “hot” IPOs – IPOs that traded strictly above the offer price, “tepid” IPOs – IPOs that traded both above and below the offer price, “cold” IPOs – IPOs that traded only at or below the offer price. Krigman et al. [1999: 1015–1044], created four groups with underpricing cutoff level measured as offer to close return: cold IPOs are defined as having underpricing of zero or below, cool IPOs having underpricing of 0–10%, hot IPOs having underpricing ranging from 10% to 60% and extra-hot IPOs defined as having underpricing greater than 60%. Such a division was tested also in the studies of Aggarwal et al. [2002: 105–137] and Aggarwal [2003: 111–135]. Acedo-Ramírez and Ruiz-Cabestre [2019: 134–159] used a fairly simple breakdown meaning that cold IPOs are those with a negative offer-to-open return and hot are those with the positive ones.

Ritter [1984] shows that there are cyclical patterns in IPO markets (i.e., ‘hot’ markets with many IPO issues are usually followed by ‘cold’ markets with few

IPO issues) and periods of high initial returns are followed by periods in which low or even negative initial returns are observed. Shiller [1990: 55–65] pointed out that any “hot” market for IPOs is somewhat concentrated in a certain class of industries and a certain group of underwriters. According to the theory of market dynamics by He [2007: 983–1020] investment banks synchronizing high IPO volume and high first-day returns as in hot periods, they produce information that improves the quality of IPO firms, and this allows ex-ante low-quality firms to go public and increases the secondary market price. Lowry et al. [2010: 425–465] find that these hot markets are also characterized by extremely high volatility of initial returns, so there is a strong positive correlation between the average of initial returns and their volatility over time. This suggests that it is very difficult for underwriters to accurately value shares of debuting companies, especially those characterized by high uncertainty. According to Rock [1986: 187–212] the greater the uncertainty about the true price of new shares, the greater the advantage of informed investors and the deeper the discount the company must offer to entice uninformed investors into the market. He indicated that during cold issue cycles, discounts are large, but the number of offers is small, and some offers are not even subscribed. During hot issue cycles, demand is higher, and discounts are smaller than in a cold cycle. According to Acedo-Ramírez and Ruiz-Cabestre [2019: 134–159] investor and underwriter reactions to opening prices on the first day of trading contaminate underpricing in the secondary market. For hot IPOs the higher the offer-to-open (primary) return, the higher the offer-to-close (total) return. For cold IPOs the more negative the offer-to-open (primary) return of a cold IPO, the higher the offer-to-close (total) return, due to price support by the underwriters. Investors try to “get on the bandwagon” of hot listings (a cascade effect occurs), and underwriters support the prices of cold listings (price support occurs). Chan [2010: 1475–1495] indicated that the effects of trading of different types of investors on IPOs’ first-day aftermarket prices depend on the hotness of the IPO when the hotness of the IPO is defined by open-to-close returns rather than by IPO volume. The empirical results of his study reveal strong evidence that retail investors are aggressive in trading hot IPOs and that the sentiment of retail investors in hot IPOs has a determining effect on these IPOs aftermarket prices in contrast, for cold and neutral IPOs their aftermarket prices on the first trading day are primarily driven by the purchases and order imbalances of institutional investors. Bradley et al. [2009: 316–330] found that hot IPOs experienced higher secondary market returns than cold IPOs.

Based on the presented literature the following hypotheses were posed:

H.2 There is a positive relationship between offer-to-open return (primary underpricing) and offer-to-close return (total underpricing) for hot IPOs.

H.3 There is a negative relationship between offer-to-open return (primary underpricing) and offer-to-close return (total underpricing) for cold IPOs.

H.4 There is a positive relationship between offer-to-open return (primary underpricing) and open-to-close return (secondary underpricing) for hot IPOs.

H.5 There is a negative relationship between offer-to-open return (primary underpricing) and open-to-close return (secondary underpricing) for cold IPOs.

2. RESEARCH METHOD AND DATA SELECTION

To verify the hypotheses, the statistical analysis covering either companies debuting on the regulated market of the Warsaw Stock Exchange between 2005 and 2022 or companies debuting on the NewConnect market between 2007 and 2022 was conducted. The initial group included 451 companies debuting on the regulated market and 668 companies debuting on the alternative market respectively. Consistent with other studies [Loughran and Ritter 1995: 23–51; 2002: 413–443; 2004: 5–37] among others the following entities were excluded from the analysis: companies that changed the trading floor from MTS Ceto and NewConnect to the regulated market, companies debuting after demerger by spin-off, companies without a public offering, foreign companies, companies for which no data was available. After the exclusions the research sample consisted of 271 companies debuting on the regulated market of the Warsaw Stock Exchange between 2005 and 2022 and 585 companies debuting on the NewConnect market between 2007 and 2022.

The data was obtained from daily statistics presented on <https://www.gpw.pl/statystyki-gpw> for the main market and <https://newconnect.pl/statystyki-okresowe> for the alternative market.

Primary underpricing was measured as “offer to open return” and is called also “opening return”.

$$R_P = \frac{P_{i_o} - P_{i_a}}{P_{i_a}}$$

where:

P_{i_o} – the opening price of the i -th offer from the first day of trading;

P_{i_a} – the offer price set by the i -th offering.

Secondary underpricing was measured as “open to close” return and is called also “intraday return”.

$$R_S = \frac{P_{i_c} - P_{i_o}}{P_{i_o}}$$

where:

P_{i_o} – the opening price of the i -th offer on the first day of trading;

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

Total underpricing was measured as “offer to close return” and is called also “first day return”.

$$R_T = \frac{P_{i_c} - P_{i_a}}{P_{i_a}}$$

where:

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

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

Using initial returns, rather than adjusted initial returns, is according to Barry and Jenings [1993: 54–63] who proved that underpricing is almost entirely “corrected” by the market at the opening. The price adjusts to the equilibrium value through the interaction of buyers with market makers and dealers in a single transaction. Therefore, they suggest that in studies of the price behavior of IPOs that use time frames as short as one day, there is no need to adjust initial returns to the market.

The study uses Chan’s approach [2010: 1475–1495], which, using a split between primary and secondary market returns, divided IPOs into cold, hot and neutral offerings as follows:

- cold IPOs belonging to the bottom tercile of the open-to-close return distribution;
- neutral IPOs – IPOs belonging to the middle of the open-to-close terciles return distribution;
- hot IPOs – IPOs belonging to the top terciles of the open-to-close return distribution.

T-tests for estimation of the significance of the rate of returns both on regulated and alternative market were conducted. For the differences between rates of returns on regulated and alternative market unpaired T-tests were carried out. The correlations were estimated using Pearson’s index. The strength of the correlation between the variables was measured based on the scale proposed by Davies [1971]: very high (0.70–1.00), high (0.50–0.69), moderate (0.30–0.49), lower (0.10–0.29), and to be ignored (0.01–0.09). All statistical significance results assume that observations are cross sectionally independent and that the underlying returns distributions are normal.

3. RESULTS

Table 1 shows the distribution of sample companies obtaining positive, negative and “zero” returns. More than 73% companies sampled on the regulated market had positive returns that were calculated on an offer-to-open basis and almost 68% on an offer-to-close basis, while only 41% had positive intraday returns. On the alternative market the opening positive returns obtained more than 82% while only about 34% received positive intraday returns.

Table 1. The distribution of positive, negative and zero returns

Description	Total underpricing	Primary underpricing	Secondary underpricing
Regulated market			
mean	0.1326	0.1314	-0.0015
median	0.0533	0.0622	-0.0107
standard deviation	0.3731	0.2658	0.1124
“>0”	69.74%	73.43%	41.33%
“<0”	26.57%	21.03%	56.09%
“=0”	3.69%	5.54%	2.58%
N	271		
NewConnect			
mean	0.3458	0.3639	-0.0143
median	0.1333	0.2245	-0.0348
standard deviation	1.0666	1.0275	0.2567
“>0”	67.69%	82.05%	33.85%
“<0”	28.21%	13.85%	59.66%
“=0”	4.10%	4.10%	6.50%
N	585		

Source: Own calculations.

Table 2 includes the results of both the primary and secondary market returns on the regulated market. It should be highlighted that there were no IPOs on the regulated market in 2022, and the debuts concerned only companies switching from the New Connect market to the regulated market, which were excluded from the original research sample. Statistically significant primary underpricing (offer-to-open) exceeds 99% of the total underpricing while secondary underpricing (open-to-close) return is negative but not statistically significant. Interestingly, companies debuting in the technology sector had the highest statistically significant rate in the primary market and at the same time the lowest statistically significant rate in the secondary market.

Table 2. Underpricing on regulated market

Sample classification	N	Primary underpricing		Secondary underpricing		Total underpricing	
		R _P	t-stat	R _S	t-stat	R _T	t-stat
All sample companies	271	0.1314	8.1224***	-0.0015	-0.2145	0.1326	5.8424***
By industry							
industrial and construction production	61	0.0908	4.1688***	-0.0007	-0.0726	0.0883	3.8269***
finance	47	0.1584	2.8941***	0.0362	1.6937*	0.2362	2.219**
commerce and services	43	0.1508	3.2256***	0.0198	1.4523	0.1671	3.7789***
consumer goods	41	0.0908	4.4386***	-0.0322	-1.4316	0.0512	1.9563*
technology	30	0.2263	3.2941***	-0.0543	-2.9817***	0.1349	3.1851***
chemistry and raw materials	21	0.0623	2.2263**	-0.0113	-0.843	0.0525	1.4544
healthcare	16	0.1820	2.6503**	-0.0028	-0.1297	0.1850	2.1681**
fuel and energy	12	0.1173	1.7692	0.0268	0.5665	0.1720	1.2416
By listing year							
2005	33	0.1098	4.2527***	-0.0202	-2.629**	0.0859	3.457***
2006	31	0.3669	3.7249***	0.0133	0.3879	0.4147	2.5642**
2007	57	0.1613	6.055***	0.0138	0.8709	0.1825	4.6161***
2008	24	0.0440	1.7944*	-0.0632	-1.9039*	-0.0210	-0.5053
2009	10	0.1269	2.3075**	0.0119	0.4424	0.1338	3.1057**
2010	20	0.0896	4.1986***	-0.0253	-1.6363	0.0599	2.7621**
2011	17	0.0072	0.2678	0.0347	1.9164*	0.0388	1.551
2012	8	0.0865	1.6144	0.0609	1.2905	0.1556	1.8024
2013	11	0.0618	1.2161	0.0163	0.5445	0.0724	1.6084
2014	12	0.0192	1.4166	0.0020	0.1422	0.0197	2.1637*
2015	13	0.0197	0.7855	0.0070	0.2555	0.0218	0.9987
2016	12	0.0487	2.0479*	0.0039	0.3353	0.0517	2.3273**
2017	5	0.0940	1.6216	-0.0528	-1.204	0.0299	0.926
2018	3	0.0668	1.4009	0.0470	0.5208	0.1209	0.8692
2019	1	0.1945	–	-0.0394	–	0.1474	–
2020	4	0.8294	2.4665*	-0.0453	-0.9271	0.7187	2.5463*
2021	10	0.0553	1.5432	-0.0097	-0.4037	0.0448	1.0401
2022	0	–	–	–	–	–	–

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

Source: Own calculations.

Table 3 includes the results of both the primary and secondary market returns on the alternative market. Statistically significant underpricing on the primary market exceeds 95% of the total underpricing while secondary underpricing (open-to-close) return is negative but not statistically significant. The highest primary underpricing was observed for the commerce and services industry. A surprisingly high return was observed on the secondary market for consumer good industry, but it is not statistically significant.

Table 3. Underpricing on NewConnect

Sample classification	N	Primary underpricing		Secondary underpricing		Total underpricing	
		R _P	t-stat	R _S	t-stat	R _T	t-stat
All sample companies	585	0.3639	8.5059***	-0,0143	-1.3412	0,3458	7.7885***
By industry							
commerce and services	266	0.4589	5.1008***	-0,0272	-1.6707*	0.4007	4.7206***
technology	117	0.3309	9.8753***	0,0017	0.0685	0.3561	6.0639***
finance	89	0.2603	7.0529***	-0,0194	-0.699	0.2359	4.7979***
industrial and construction production	45	0.2576	5.7800***	0,0260	0.8612	0.2806	5.0797***
healthcare	39	0.2720	3.0796***	-0,0202	-0.4491	0.3434	1.4651
chemistry and raw materials	11	0.3508	3.9386***	-0,0328	-0.6612	0.3170	2.5782**
fuel and energy	11	0.1357	1.4523	-0.0525	-0.95	0.0627	0.6529
consumer goods	7	0.1942	1.4468	0.1358	1.2605	0.4102	1.5179
By listing year							
2007	23	0.9086	2.8558***	0.0507	0.5302	1.4553	1.7332*
2008	55	1.0135	2.5159**	-0.1451	-4.092***	0.4134	2.5018**
2009	22	0.6762	3.7977***	0.1835	1.291	1.1797	2.402**
2010	73	0.3612	8.8458***	-0.0195	-0.9287	0.3456	6.5058***
2011	148	0.2304	9.6466***	-0.0473	-3.5456***	0.1747	5.9347***
2012	83	0.2399	9.0463***	-0.0215	-1	0.2189	5.6645***
2013	37	0.2062	6.0286***	0.0476	1.4217	0.2719	4.4851***
2014	18	0.2868	5.7380***	0.1077	2.1136**	0.4402	4.3047***
2015	14	0.2704	4.8743***	0.1539	1.9582*	0.4925	3.2565***
2016	14	0.4687	6.8053***	-0.0097	-0.1592	0.4677	4.0249***
2017	19	0.2552	3.2411***	0.0414	0.698	0.3367	2.6431**
2018	14	0.3645	4.7554***	0.0413	0.4994	0.4456	2.7329**
2019	12	0.3457	4.3664***	0.0616	0.7367	0.4556	2.6708**
2020	6	0.1630	1.6337	-0.0620	-1.2353	0.1082	0.6966
2021	32	0.1393	2.3490**	-0.0310	-1.1176	0.1133	1.4832
2022	15	-0.1144	-1.6585	-0.1233	-1.5923	-0.1926	-1.4875

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

Source: Own calculations.

Table 4. Differences in underpricing between regulated and alternative markets

Year	# RM	# NC	Primary underpricing		Secondary underpricing		Total underpricing					
			R _P (RM)	R _P (NC)	t-stat	R _S (RM)	R _S (NC)	t-stat	R _T (RM)	R _T (NC)	t-stat	
By listing year												
2005	33	-	0.1098	-	-	-0.0202	-	0.0859	-	-	-	-
2006	31	-	0.3669	-	-	0.0133	-	0.4147	-	-	-	-
2007	57	23	0.1613	0.9086	-4.6074***	0.0138	0.0507	0.1825	1.4553	-2.2401**	0.4134	1.4553
2008	24	55	0.0440	1.0135	-0.6445	-0.0632	-0.1451	-0.0210	0.4134	6.0703***	0.1338	0.4134
2009	10	22	0.1269	0.6762	-3.0376***	0.0119	0.1835	0.1338	1.1797	-1.5055	0.1338	1.1797
2010	20	73	0.0896	0.3612	-11.1198***	-0.0253	-0.0195	0.0599	0.3456	-0.8926	0.0599	0.3456
2011	17	148	0.0072	0.2304	-11.3585***	0.0347	-0.0473	0.0388	0.1747	13.2654***	0.0388	0.1747
2012	8	83	0.0865	0.2399	-7.5736***	0.0609	-0.0215	0.1556	0.2189	6.1493***	0.1556	0.2189
2013	11	37	0.0618	0.2062	-10.8986***	0.0163	0.0476	0.0724	0.2719	-2.7223***	0.0724	0.2719
2014	12	18	0.0192	0.2868	-27.0103***	0.0020	0.1077	0.0197	0.4402	-10.2441***	0.0197	0.4402
2015	13	14	0.0197	0.2704	-26.6477***	0.0070	0.1539	0.0218	0.4925	-8.2681***	0.0218	0.4925
2016	12	14	0.0487	0.4687	-29.4469***	0.0039	-0.0097	0.0517	0.4677	1.2871	0.0517	0.4677
2017	5	19	0.0940	0.2552	-3.4221***	-0.0528	0.0414	0.0299	0.3367	-3.5259***	0.0299	0.3367
2018	3	14	0.0668	0.3645	-7.0052***	0.0470	0.0413	0.1209	0.4456	0.1135	0.1209	0.4456
2019	1	12	0.1945	0.3457	-	-0.0394	0.0616	0.1474	0.4556	-	0.1474	0.4556
2020	4	6	0.8294	0.1630	6.5201***	-0.0453	-0.0620	0.7187	0.1082	2.4512**	0.7187	0.1082
2021	10	32	0.0553	0.1393	-2.6632**	-0.0097	-0.0310	0.0448	0.1133	2.9924***	0.0448	0.1133
2022	-	15	-	-0.1144	-	-	-0.1233	-	-0.1926	-	-	-0.1926

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

Source: Own calculations.

Table 4 includes the results of t-test of the differences in underpricing between regulated and alternative markets. It has been confirmed that except for a few years, there are statistically significant differences in returns between the regulated market and NewConnect calculated for both primary and secondary markets. Overall results indicate that the debuts on NewConnect are more underpriced. This is consistent with Johan research [2010] indicating that the signalling benefit of high listing standards is manifested in less underpricing. Similarly, Carpentier et al. [2012: 56–91] argued the choice of the listing method and regulation strictness significantly influence the value and long-run performance of newly listed firms, which is consistent with theories suggesting that a commitment by a firm to a stricter regulatory oversight lowers the information asymmetry component of the cost of capital, reducing the heterogeneity of expectations and mispricing.

It has been proved that either in regulated market or in alternative market the main beneficiaries of underpricing are investors participating in the offering, thus hypothesis 1 has been confirmed.

Table 5. The relationship between underpricing (hotness according to Chan)

Description	Cold IPOs	Neutral IPOs	Hot IPOs	All IPOs
Regulated Market				
N	89	90	92	271
Primary underpricing	0.1830***	0.0973***	0.1148***	0.1314***
Secondary underpricing	-0.0926***	-0.0110***	0.0960***	-0.0015
Total underpricing	0.0661***	0.0849***	0.2438***	0.1326***
Pearson correlation between Primary and Secondary	-0.3083***	-0.1270	0.6646***	0.0983
Pearson correlation between Primary and Total	0.8592***	0.9963***	0.9672***	0.8451***
Pearson correlation between Secondary and Total	0.1817*	-0.0428	0.7982***	0.5566***
NewConnect				
N	193	156	236	585
Primary underpricing	0.4406***	0.1763***	0.4251***	0.3639***
Secondary underpricing	-0.2404***	-0.0552***	0.1975***	-0.0143
Total underpricing	0.0132	0.1112***	0.7730***	0.3458***
Pearson correlation between Primary and Secondary	-0.4496***	-0.0222	0.4088***	0.0058
Pearson correlation between Primary and Total	0.8033***	0.9897***	0.9100***	0.5622***
Pearson correlation between Secondary and Total	-0.0290	0.1180	0.6593***	0.6000***

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

Source: Own calculations.

Table 5 shows the results of the relationship between primary, secondary, and total returns on the regulated market and NewConnect depending on the “hotness” of the market. As highlighted earlier, the decisive share of total underpricing is

accounted for by the rates of return achieved on the primary market. The results confirmed that there is a significant statistical correlation between primary and total underpricing. At the same time, the returns achieved on the primary market have no effect on the returns achieved on the secondary market which suggests there is no presence of informational cascades that extend past the opening of aftermarket trading following an IPO. Furthermore, as it was defined earlier, I divided the sample into cold, neutral, and hot IPOs according to Chan's approach [2010: 1475–1495]. Given the definition used, on regulated market cold markets included all IPOs that had an open to close return lower than -0.0362 , neutral markets included those IPOs with an open to close return between -0.0362 and 0.0145 , and hot markets included those with an open to close return greater than 0.0145 . Similarly, on NewConnect cold markets included all IPOs that had an open to close return lower than -0.1156 , neutral markets included those IPOs with an open to close return between -0.1156 and 0 , and hot markets included those with an open to close return greater than 0 . It is worth noting that in the regulated market, the average primary underpricing for cold IPOs is higher (0.1830) than for hot IPOs (0.1148), but differences can be seen in total underpricing of 0.0661 versus 0.2438 , respectively. A similar situation is observed on NewConnect where the average primary underpricing for cold IPOs is higher (0.4406) than for hot IPOs (0.4251), with respective differences in total underpricing of 0.0132 versus 0.7730 . Average secondary underpricing is negative for cold IPOs and positive for hot IPOs on both, the regulated (-0.0926 and 0.0960) and alternative market (-0.2404 and 0.1975).

CONCLUSIONS AND DISCUSSION

The research identifies underpricing of initial public offerings in Poland on the regulated and alternative markets, by using the first day raw returns (offer to close returns), opening price returns (offer to open returns), and the intraday returns (open to close returns). The statistical analysis covers 271 companies debuting on the regulated market of the Warsaw Stock Exchange between 2005 and 2022 and 585 companies debuting on NewConnect between 2007 and 2022.

The results of the analysis show that in Poland, the IPO underpricing occurring in the primary market is significantly positive, representing the remuneration of subscribers for participating in the initial public offering. Moreover, it is higher for IPO on the alternative market than on the regulated market. In contrast, returns calculated from opening prices to closing prices on the first day of trading are negative in both markets, with lower returns in the NewConnect market. The presented tests provide evidence that the first day's return on IPOs is earned at the opening transaction. Either on a regulated or on an alternative market the average primary underpricing for cold IPOs is higher than for hot IPOs. Average

secondary underpricing is negative for cold IPOs and positive for hot IPOs on both the regulated and alternative market.

There is a strong statistically significant positive correlation between primary and total underpricing regardless of the hotness of the IPOs (hypothesis 2 is confirmed and hypothesis 3 is rejected). These results support the findings confirming hypothesis 1, according to which the original purchasers of the shares are the main beneficiaries of underpricing, not those who jump on the bandwagon. However, there is evidence of the cascade effect for hot IPOs, which suggests that investors follow the behavior of preceding investors as was indicated by Welch [1992].

There is no evidence that price support of the underwriters occurs on the Polish market. This is consistent with the author's own research indicating that stabilization that is one of the methods of such support, occurs very rarely in IPOs on the Warsaw Stock Exchange (only around 9% of IPOs have such foreseen option, but the exercise was reported by only a few companies).

Furthermore, a positive statistically significant correlation between primary and secondary underpricing occurs only for hot markets, so hypothesis 4 is confirmed. This points out that investors get on the bandwagon and one can conclude that the cascade effect occurs during hot IPOs. Such results are consistent with the findings of Chan [2010: 1475–1495]. There is also a negative but moderate correlation between primary underpricing and secondary underpricing for cold IPOs both on regulated and alternative markets, so hypothesis 5 can neither be confirmed nor rejected.

The limitation of the study is the lack of relationship between the rate of returns with turnover and volatility, so in further research this element should be included.

REFERENCES

- Acedo-Ramírez, M.Á. and Ruiz-Cabestre, F.J. (2019). Total and Primary Underpricings in the IPO Market: Are They Explained by the Same Variables? *Spanish Journal of Finance and Accounting / Revista Española de Financiación y Contabilidad*, no. 48(2), pp. 134–159.
- Acedo-Ramírez, M.Á., and Ruiz-Cabestre, F.J. (2014). Secondary Price Formation of IPOs on the First Trading Day in the Spanish Market. *Revista de Economía Aplicada*, no. 22(65), pp. 71–97.
- Aggarwal, R. (2000). Stabilization Activities by Underwriters after Initial Public Offerings. *The Journal of Finance*, no. 55(3), pp. 1075–1103, <https://doi.org/10.1111/0022-1082.00241>
- Aggarwal, R. (2003). Allocation of Initial Public Offerings and Flipping Activity. *Journal of Financial Economics*, no. 68(1), pp. 111–135, [https://doi.org/10.1016/S0304-405X\(02\)00250-7](https://doi.org/10.1016/S0304-405X(02)00250-7)
- Aggarwal, R. and Conroy, P. (2000). Price Discovery in Initial Public Offerings and the Role of the Lead Underwriter. *The Journal of Finance*, no. 55(6), pp. 2903–2922, <https://doi.org/10.1111/0022-1082.00312>
- Aggarwal, R., Krigman, L. and Womack, K. (2002). Strategic IPO Underpricing, Information Momentum, and Lockup Expiration Selling. *Journal of Financial Economics*, no. 66(1), pp. 105–137, [https://doi.org/10.1016/S0304-405X\(02\)00152-6](https://doi.org/10.1016/S0304-405X(02)00152-6)

- Allen, F. and Faulhaber, G.R. (1989). Signaling by Underpricing in the IPO Market, *Journal of Financial Economics*, no. 23(2), pp. 303–324, [https://doi.org/10.1016/0304-405X\(89\)90060-3](https://doi.org/10.1016/0304-405X(89)90060-3)
- Barry, Ch.B. and Jennings, R.H. (1993). The Opening Price Performance of Initial Public Offerings of Common Stock. *Financial Management*, no. 22(1), pp. 54–63, <https://doi.org/10.2307/3665965>
- Bear, R.M. and Curley, A.J. (1975). Unseasoned Equity Financing. *The Journal of Financial and Quantitative Analysis*, no. 10(2), pp. 311–325, <http://dx.doi.org/10.2307/2979038>
- Bhagat, S., Lu, J. and Rangan, S. (2018). *IPO Valuation: The International Evidence*. In: D. Cumming, S.A. Johan ed., *The Oxford Handbook of IPO*, pp. 108–145. New York: Oxford University Press.
- Bradley, D.J., Gonas, J.S., Highfield, M.J. and Roskelley, K.D. (2009). An Examination of IPO Secondary Market Returns. *Journal of Corporate Finance*, no. 15(3), pp. 316–330, <https://doi.org/10.1016/j.jcorpfin.2009.01.003>
- Carpentier, C., Cumming, D. and Suret J.M. (2012). The Value of Capital Market Regulation: IPOs Versus Reverse Mergers. *Journal of Empirical Legal Studies*, no. 9(1), pp. 56–91, <https://doi.org/10.1111/j.1740-1461.2011.01247.x>
- Chan, K., Wang, J. and Wei, K. (2004). Underpricing and long-term performance of IPOs in China. *Journal of Corporate Finance*, no. 10(3), pp. 409–430, [https://doi.org/10.1016/S0929-1199\(03\)00023-3](https://doi.org/10.1016/S0929-1199(03)00023-3)
- Chan, Y. (2010). Retail Trading and IPO Returns in the Aftermarket. *Financial Management*, no. 39(4), pp. 1475–1495, <https://doi.org/10.1111/j.1755-053X.2010.01119.x>
- Chang, E., Chen, Ch., Chi, J. and Young, M. (2008). IPO Underpricing in China: New Evidence from the Primary and Secondary Markets. *Emerging Markets Review*, no. 9(1), pp. 1–16.
- Davies, J.A. (1971). *Elementary survey analysis*. New Jersey: Prentice Hall.
- Derrien, F. (2005). IPO Pricing in “Hot” Market Conditions: Who Leaves Money on the Table? *The Journal of Finance*, no. 60(1), pp. 487–521, <https://doi.org/10.1111/j.1540-6261.2005.00736.x>
- Dudycz, T. and Brycz B. (2017). What Drives the Amount of Capital Raised at IPO? Evidence from the Warsaw Stock Exchange. *Argumenta Oeconomica*, no. 2(39), pp. 61–89, <https://doi.org/10.15611/aoe.2017.2.03>
- Ellis, K. (2006). Who trades IPOs? A close look at the first days of trading. *Journal of Financial Economics*, no. 79(2), pp. 339–363, <https://doi.org/10.1016/j.jfineco.2004.09.006>
- Ellis, K., Michaely R. and O’Hara M. (2000). When the Underwriter Is the Market Maker: An Examination of Trading in the IPO Aftermarket. *The Journal of Finance*, no. 55(3), pp. 1039–1074, <https://doi.org/10.1111/0022-1082.00240>
- Gale, I. and Stiglitz, J.E. (1989). The Informational Content of Initial Public Offerings. *The Journal of Finance*, no. 44(2), pp. 469–477, <https://doi.org/10.1111/j.1540-6261.1989.tb05066.x>
- Hadro, D. and Pauka, M. (2019). Underpricing on the Selected European Alternative Investment Markets. *Financial Internet Quarterly “e-Finance”*, no. 15(2), pp. 87–94, <https://doi.org/10.2478/fiqf-2019-0014>
- He, P. (2007). A Theory of IPO Waves. *The Review of Financial Studies*, no. 20(4), pp. 983–1020, <https://doi.org/10.1093/revfin/hhm004>
- Helwege, J. and Liang, N. (2004). Initial Public Offerings in Hot and Cold Markets. *The Journal of Financial and Quantitative Analysis*, no. 39(3), pp. 541–569. <https://doi.org/10.1017/S0022109000004026>
- Ibbotson, R.G. (1975). Price Performance of Common Stock New Issues. *Journal of Financial Economics*, no. 2(3), pp. 235–272, [https://doi.org/10.1016/0304-405X\(75\)90015-X](https://doi.org/10.1016/0304-405X(75)90015-X)
- Ibbotson, R.G. and Jaffe, J. (1975). ‘Hot issue’ markets. *Journal of Finance*, no. 30(4), pp. 1027–1042, [https://doi.org/10.1016/0304-405X\(75\)90015-X](https://doi.org/10.1016/0304-405X(75)90015-X)
- Ibbotson, R.G., Sindelar, J.L. and Ritter, J.R. (1988). Initial public offerings. *Journal of Applied Corporate Finance*, no. 1(2), pp. 37–45, <https://doi.org/10.1111/j.1745-6622.1988.tb00164.x>

- Ibbotson, R.G., Sindelar, J.L. and Ritter, J.R. (1994). The Market's Problems with the Pricing of Initial Public Offering. *Journal of Applied Corporate Finance*, no. 7(1), pp. 66–74, <https://doi.org/10.1111/j.1745-6622.1994.tb00395.x>
- Johan, S.A. (2010). Listing standards as a signal of IPO preparedness and quality. *International Review of Law and Economics*, no. 30(2), pp. 128–144, <https://doi.org/10.1016/j.irle.2009.12.001>
- Krigman, L., Shaw, W.H. and Womack, K.L. (1999). The Persistence of IPO Mispricing and the Predictive Power of Flipping. *The Journal of Finance*, no. 54(3), pp. 1015–1044, <https://doi.org/10.1111/0022-1082.00135>
- Lizińska, J. and Czapiewski, I. (2015). Determinanty underpricingu w Polsce i na innych rynkach wschodzących. *Prace Naukowe Uniwersytetu Ekonomicznego we Wrocławiu*, nr 386, s. 112–125.
- Lizińska, J. and Czapiewski, L. (2014). Performance of Polish IPO Firms: Size and Profitability Effect. *Gospodarka Narodowa*, no. 1, pp. 53–71, <https://doi.org/10.33119/GN/100877>
- Ljungqvist, A. (2007). *IPO Underpricing*. In: B.E. Eckbo ed., *Handbook of Corporate Finance*, pp. 375–422. North Holland: Elsevier.
- Ljungqvist, A.P. (1997). Pricing initial public offerings: Further evidence from Germany. *European Economic Review*, no. 41(7), pp. 1309–1320, [https://doi.org/10.1016/S0014-2921\(96\)00035-9](https://doi.org/10.1016/S0014-2921(96)00035-9)
- Loughran, T. and Ritter, J.R. (1995). The New Issues Puzzle. *The Journal of Finance*, no. 50(1), pp. 23–51, <https://doi.org/10.1111/j.1540-6261.1995.tb05166.x>
- Loughran, T. and Ritter, J.R. (2002). Why Don't Issuers Get Upset about Leaving Money on the Table in IPOs? *The Review of Financial Studies*, no. 15(2), pp. 413–443, <https://doi.org/10.1093/rfs/15.2.413>
- Loughran, T. and Ritter, J.R. (2004). Why Has IPO Underpricing Changed Over Time? *Financial Management*, no. 3(4), pp. 5–37, <http://dx.doi.org/10.2139/ssrn.331780>
- Loughran, T., Ritter, J.R. and Rydqvist, K. (1994). Initial Public Offerings: International Insights. *Pacific-Basin Finance Journal*, no. 2, pp. 165–199, [https://doi.org/10.1016/0927-538X\(94\)90016-7](https://doi.org/10.1016/0927-538X(94)90016-7)
- Lowry, M. (2003). Why does IPO volume fluctuate so much? *Journal of Financial Economics*, no. 67(1), pp. 3–40, [https://doi.org/10.1016/S0304-405X\(02\)00230-1](https://doi.org/10.1016/S0304-405X(02)00230-1)
- Lowry, M., Officer, M.S. and Schwert, G.W. (2010). The Variability of IPO Initial Returns. *The Journal of Finance*, no. 65(2), pp. 425–465, <https://doi.org/10.1111/j.1540-6261.2009.01540.x>
- Mąka, M. (2008). Stabilizowanie kursów akcji i praw do akcji w świetle prawa polskiego i prawa wspólnotowego. *Transformacje Prawa Prywatnego*, nr 1, s. 19–31.
- McDonald, J.G. and Fisher, A.K. (1972). New-Issue Stock Price Behavior. *The Journal of Finance*, no. 27(1), pp. 97–102, <https://doi.org/10.1111/j.1540-6261.1972.tb00624.x>
- Miller, E.E. (1977). Risk, uncertainty, and divergence of opinion. *Journal of Finance*, no. 32(4), pp. 1151–1168, <https://doi.org/10.2307/2326520>
- Miller, R.E. and Reilly, F.K. (1987). An Examination of Mispricing, Returns, and Uncertainty for Initial Public Offerings. *Financial Management*, no. 16(2), pp. 33–38, <https://doi.org/10.2307/3666001>
- Mizerka, J. i Lizińska, J., red. (2017). *Pierwsze oferty publiczne w Polsce i na świecie. Kontrowersje wokół anomalii rynkowych*. Warszawa: CeDeWu.
- Neuberger, B.M. and Hammond, C.T. (1974). A Study of Underwriters' Experience with Unseasoned New Issues. *Journal of Financial and Quantitative Analysis*, no. 9(2), pp. 165–177, <http://dx.doi.org/10.2307/2330092>
- Perera, W. and Kulendran, N. (2016). New evidence of short-run underpricing in Australian IPOs. *Investment Management and Financial Innovations*, no. 13(2), pp. 99–108, [http://dx.doi.org/10.21511/imfi.13\(2\).2016.11](http://dx.doi.org/10.21511/imfi.13(2).2016.11)

- Podedworna-Tarnowska, D. (2020). *Niedowartościowanie spółek debiutujących na rynku głównym i alternatywnym Giełdy Papierów Wartościowych w Warszawie*. W: P. Antonowicz, P. Galiński, P. Pisarewicz, red., *Perspektywa ekonomiczna, finansowa i prawna kreowania wartości w gospodarce*, s. 267–281. Gdańsk: Wydawnictwo Uniwersytetu Gdańskiego.
- Podedworna-Tarnowska, D. (2022). Costs of IPO in Poland. *Annales Universitatis Mariae Curie-Skłodowska, Sectio H – Oeconomia*, no. 56(4), pp. 135–160, <http://dx.doi.org/10.17951/h.2022.56.4.135-160>
- Pomykalski, P. and Domagalski, M. (2015). IPO Underpricing and Financial Analysts' Forecast Accuracy in Poland. *Acta Universitatis Lodzianae, Folia Oeconomica*, no. 1(310), pp. 117–132, <https://doi.org/10.18778/0208-6021.310.09>
- Puławski, M. (2013). Koszt pierwszej oferty publicznej na rynku akcji w Polsce w latach 2008–2012. *Zeszyty Naukowe Uniwersytetu Szczecińskiego. Finanse, Rynki Finansowe, Ubezpieczenia*, nr 63, s. 435–447.
- Reilly, F.K. (1973). Further Evidence on Short-Run Results for New Issue Investors. *The Journal of Financial and Quantitative Analysis*, no. 8(1), pp. 83–90, <https://doi.org/10.2307/2329750>
- Reilly, F.K. (1977). New Issues Revisited. *Financial Management*, no. 6(4), pp. 28–42, <http://dx.doi.org/10.2307/3664963>
- Reilly, F.K. and Hatfield, K. (1969). Investor Experience with New Stock Issues. *Financial Analysts Journal*, no. 25(5), pp. 73–80, <http://dx.doi.org/10.2469/faj.v25.n5.73>
- Ritter, J.R. (1984). The “Hot Issue” Market of 1980. *The Journal of Business*, no. 57(2), pp. 215–240, <http://doi.org/10.1086/296260>
- Ritter, J.R. (1987). The Costs of Going Public. *Journal of Financial Economics*, no. 19(2), pp. 269–281, [https://doi.org/10.1016/0304-405X\(87\)90005-5](https://doi.org/10.1016/0304-405X(87)90005-5)
- Ritter, J.R. (2003). Differences between European and American IPO Markets. *European Financial Management*, no. 9(4), pp. 421–434, <https://doi.org/10.1111/1468-036X.00230>
- Ritter, J.R. and Welch, I. (2002). A Review of IPO Activity, Pricing, and Allocations. *The Journal of Finance*, no. 57(4), pp. 1795–1828, <https://doi.org/10.1111/1540-6261.00478>
- Rock, K. (1986). Why new issues are underpriced? *Journal of Financial Economics*, no. 15, pp. 187–212, [https://doi.org/10.1016/0304-405X\(86\)90054-1](https://doi.org/10.1016/0304-405X(86)90054-1)
- Rydqvist, K. and Hogholm, K. (1995). Going public in the 1980s: Evidence from Sweden. *European Financial Management*, no. 1(3), pp. 287–315, <https://doi.org/10.1111/j.1468-036X.1995.tb00021.x>
- Schultz, P.H. and Zaman, M.A. (1994). After Market Support and Underpricing of Initial Public Offerings. *Journal of Financial Economics*, no. 35(2), pp. 199–219, [https://doi.org/10.1016/0304-405X\(94\)90004-3](https://doi.org/10.1016/0304-405X(94)90004-3)
- Shiller, R.J. (1990). Speculative Prices and Popular Models. *Journal of Economics Perspectives*, no. 4(2), pp. 55–65, <http://dx.doi.org/10.1257/jep.4.2.55>
- Sieradzki, R. (2016). *Niedowartościowanie pierwotnych ofert publicznych na przykładzie akcji notowanych na Giełdzie Papierów Wartościowych w Warszawie*. Rozprawa doktorska. Kraków: Uniwersytet Ekonomiczny w Krakowie.
- Siwek, P. (2005). *Praktyka pierwszych ofert publicznych w Polsce*. Warszawa: CeDeWu.
- Stoll, H.R. and Curley, A.J. (1970). Small Business and the New Issues Market for Equities. *The Journal of Financial and Quantitative Analysis*, no. 5(3), pp. 309–322, <http://dx.doi.org/10.2307/2329998>
- Stoughton, N.M., Wong, K.P. and Zechner, J. (2001). IPOs and Product Quality. *The Journal of Business*, no. 74(3), pp. 375–408, <https://doi.org/10.1086/321931>
- Sukacz, D. (2005). *Pierwsze oferty publiczne na rynkach kapitałowych*. Warszawa: CeDeWu.
- Welch, I. (1992). Sequential Sales, learning, and Cascades. *The Journal of Finance*, no. 47(2), pp. 695–732, <http://dx.doi.org/10.1111/j.1540-6261.1992.tb04406.x>

- Vismara, S., Paleari, S. and Ritter, J.R. (2012). Europe's Second Markets for Small Companies. *European Financial Management*, no. 18(3), pp. 352–388, <https://doi.org/10.1111/j.1468-036X.2012.00641.x>
- Zarzecki, D. and Wołoszyn, A. (2013). The impact of the January Effect on the IPO Underpricing in Poland. *Folia Oeconomica Stetinensia*, no. 13(1), pp. 121–135, <https://doi.org/10.18276/frfu.2016.4.82/2-28>

NOWE UJĘCIE ZJAWISKA UNDERPRICINGU W POLSCE

STRESZCZENIE

Cel artykułu/hipoteza. Celem artykułu jest identyfikacja i ocena niedowartościowania pierwszej oferty publicznej w Polsce na rynku regulowanym i alternatywnym z uwzględnieniem podziału całkowitego niedowartościowania na niedowartościowanie pierwotne i niedowartościowanie wtórne. W badaniu uwzględniono również różne rodzaje IPO (zimne, neutralne, gorące). Takie podejście do obliczania underpricingu w oparciu o dane pochodzące zarówno z rynku regulowanego Giełdy Papierów Wartościowych w Warszawie, jak i rynku alternatywnego – NewConnect, jest pionierskie na polskim rynku.

Metodyka. Analizą statystyczną objęto 271 spółek debiutujących na rynku regulowanym Giełdy Papierów Wartościowych w Warszawie w latach 2005–2022 oraz 585 spółek debiutujących na rynku alternatywnym NewConnect w latach 2007–2022. Dokonano podziału łącznego niedowartościowania na niedowartościowanie pierwotne i niedowartościowanie wtórne. Podzielono IPO na oferty zimne, gorące i neutralne według poziomu wtórnego niedowartościowania. Istotność poziomu stóp zwrotu na rynku regulowanym i alternatywnym oraz różnic między nimi oceniono na podstawie testów T-studenta. Korelacje oszacowano za pomocą wskaźnika Pearsona.

Wyniki/Rezultaty badania. Wyniki analizy pokazują, że w Polsce niedowartościowanie w IPO występujące na rynku pierwotnym jest istotnie dodatnie, stanowiąc wynagrodzenie subskrybentów za uczestnictwo w pierwszej ofercie publicznej. Ponadto, jest ono wyższe dla debiutów na rynku alternatywnym niż rynku regulowanym. Natomiast stopy zwrotu wyliczane z cen otwarcia i cen zamknięcia w pierwszym dniu notowań są ujemne na obydwu rynkach, przy czym na rynku NewConnect są one niższe. Zarówno na rynku regulowanym, jak i alternatywnym średnie pierwotne niedowartościowanie dla zimnych IPO jest wyższe, niż dla gorących IPO. Średnie niedowartościowanie wtórne jest ujemne dla zimnych IPO i dodatnie dla gorących IPO zarówno na rynku regulowanym, jak i NewConnect. Co więcej, istnieje znacząca dodatnia korelacja pomiędzy pierwotnym i całkowitym niedowartościowaniem niezależnie od gorącego charakteru IPO, a dodatnia znacząca korelacja pomiędzy pierwotnym i wtórnym niedowartościowaniem występuje tylko w przypadku gorących ofert, podczas, gdy w przypadku zimnych ofert jest ona ujemna.

Słowa kluczowe: pierwsza oferta publiczna (IPO), niedowartościowanie pierwotne, niedowartościowanie wtórne.

JEL Class: G12; G14; G24; G32.