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## Equity crowdfunding IPOs: Under or overpricing? The case of Poland as an example of quickly catching up economy

**JEL Classification:** G11; G23; G41

**Keywords:** equity crowdfunding; digitalization in finance; FinTech; IPO underpricing; IPO overpricing; NewConnect

### Abstract

**Research background:** The majority of research on equity crowdfunding concerns its evolution in developed countries. There are still relatively few works devoted to equity crowdfunding in developing regions, including Poland. Taking this into account and the lack of research on the effectiveness of ECF-based IPOs, there is a research gap that this article is trying to fill. This paper also contributes to the extensive literature dealing with the occurrence of the IPO underpricing phenomenon and focuses on a regional study on IPO underpricing in the still niche ECF-based IPOs.

**Purpose of the article:** The article aims to show the development of equity crowdfunding in Poland. The article also aims to (i) evaluate the effectiveness of debuts of companies that raised funds (and thus carried out their IPOs) using ECF platforms, and (ii) find the determinants of ECF-based IPOs performance.

**Methods:** The model for testing the potential determinants of ECF-based IPO performance is based on univariate linear regressions measuring the relationship between a dependent variable which stands for ECF-based IPO underpricing and one independent variable (chosen from a set of potential explanatory variables).

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**Findings & value added:** The article shows that since 2020 ECF has become an important source of financing for listed SMEs in Poland. Based on the stylized fact on the risk-return tradeoff, it is assumed that ECF-based IPOs are more underpriced than IPOs of other companies to attract investors. The paper revealed that the effectiveness of ECF-based IPOs has mainly the cyclical nature and it depends on the stock price cycle. ECF-based IPOs are more underpriced than other IPOs only in the bull market while in the bear market they are more overpriced. To the best of my knowledge, this is the first study to explore the performance of ECF-based IPOs. Although this paper focuses on Poland, it opens the potential for broader global research in this area. The article can also hold significant practical value for all participants of the ECF market.

## Introduction

Equity crowdfunding (equity-based crowdfunding, ECF) is one of the segments of crowdfunding, which is defined as the use of the internet to raise money through small contributions from a large number of investors (Estrin & Khavul, 2016; Bradford, 2012). In the case of equity crowdfunding, members of the community in exchange for financial support for the project become its co-owners by taking shares or other ownership papers. Investors usually invest relatively small funds and in return expect, inter alia, dividends from future profits, and gains resulting from selling crowdfunded shares to other investors.

Literature shows (Łukowski & Zygmanski, 2019; Cressy, 2012; Harper, 2006), there are significant limitations in access to finance especially by small and medium-sized enterprises (SMEs). There are many ways to reduce the financial gap<sup>1</sup> – ranging from debt financing to equity financing. Equity crowdfunding is one of the methods of bridging the equity gap which constitutes an important barrier to the development of small and medium-sized enterprises, especially start-ups which fundamental to innovation (Wang *et al.*, 2019; Balboni *et al.*, 2018; Schenk, 2015; OECD, 2010).

The analysis of statistical data shows that equity crowdfunding is in a booming phase. Year by year, the amount of cash that a crowd of investors – via the Internet – invest in SMEs, especially in start-ups, grows. In 2019 companies in the world (excluding China) managed to raise USD 1.14 billion in crowdfunding campaigns, and in 2020 it was already USD 1.73 billion (CCAF, World Bank & World Economic Forum, 2022). The equity

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<sup>1</sup> The financing gap is understood as limited access to external financing, both internal and external. The equity gap means limited opportunities to obtain additional equity capital for the current and investment activities (more: Wilson *et al.*, 2018).

crowdfunding industry was not negatively affected by the Covid-19 pandemic (Vu & Christian, 2024; Cumming *et al.*, 2021). The explosive growth was possible thanks to the emergence of many new companies, new platforms, and investors. Moreover, equity crowdfunding began to expand in new markets, such as in Poland, outside of the historic core markets of the UK and the US.

The equity crowdfunding literature is very rich<sup>2</sup>. However, a large number of studies focus on crowdfunding campaigns. As noted by Schwienbacher (2019) only a few studies have examined what happened after the campaign is over. The behavior of companies after a crowdfunding campaign was analyzed by e.g. Coakley *et al.* (2022b), Walthoff-Borm *et al.* (2018), Hornuf *et al.* (2018), and Signori and Vismara (2018). Vismara (2019), Cox *et al.* (2019), or Hurt (2015) studied investor exit strategies. They noticed that mergers and acquisitions (MsA) and initial public offering (IPO) transactions are among the exit strategies that a larger number of investors can take part in. It is worth noting that in older literature it was emphasized that while an IPO might be the most lucrative exit for an ECF investor, the likelihood of a crowdfunded company going public was small in developed countries, and even smaller in developing countries (Best *et al.*, 2013). However, time has verified these opinions, and listed companies from different parts of the world have made the first financing rounds on ECF platforms (Salerno *et al.*, 2022).

The article aims to show the development of equity crowdfunding in Poland which, until 1989, was devoid of a market economy and capital market<sup>3</sup>. Polish fast developing economy, if it is to continue its convergence with the major economies in the world, needs to pivot from imitation to innovation (OECD, 2023). The fintech sector, with its digital and scalable nature, stands out as a promising area for Poland to gain a competitive edge globally. Strategic partnerships between banking industry and technology providers, along with sectors like insurtech and crowdfunding, are expanding rapidly (Antal, 2024). Poland also offers a unique ecosystem for innovative companies to raise capital, characterized by a robust financial

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<sup>2</sup> As of July 2023, a search carried out by Correia *et al.* (2024) within the Scopus database, specifically within the domains of Business, Management and Accounting, as well as Economics, Econometrics and Finance, resulted in finding 287 articles that mentioned "Equity Crowdfunding" or "Equity-based crowdfunding" either in their titles, abstracts, or keywords.

<sup>3</sup> Since then, Poland has recorded tremendous economic success, which resulted, *inter alia*, in reducing the difference in GDP per capita (PPP) in relation to Germany (from 31,8% in 1990 to 70,0% in 2022) and the USA (from 25,9% in 1990 to 61,1% in 2022).

services, including equity crowdfunding platforms, a dedicated stock market tailored for SMEs (the NewConnect market on the Warsaw Stock Exchange (WSE)), and a supportive regulatory framework. This setup results in a relatively high number of ECF-based IPOs compared to other countries, providing a broader opportunity to analyze this phenomenon.

The article also aims to:

- assess the effectiveness of debuts of companies that raised money (and thus carried out their IPOs) using ECF platforms, and
- find the determinants of ECF-based IPOs performance.

In order to better understand ECF-based IPOs and their efficiency, the article formulates and addresses two research questions.

- Has crowdfunding become an important source of financing for small companies and start-ups going public?
- Assuming that due to the higher risk associated with — as a rule — earlier stage of their development, are ECF IPOs characterized by greater underpricing compared to IPOs of other companies?

The study formulates and tests two hypotheses describing the performance of ECF-based IPOs in Poland:

- The first hypothesis [H1] states that ECF-based IPOs are more underpriced than IPOs of other companies to attract investors to buy shares offered with the use of equity crowdfunding,
- The second hypothesis [H2] assumes that the effectiveness of ECF-based IPOs has mainly the cyclical nature and it depends on stock price cycle.

The hypothesis [H1] is based on a stylized fact of the risk-return tradeoff and a rich literature on IPO underpricing. A positive correlation between risk and return indicates that the higher the risk, the higher the expected return. Assuming that ECF-based IPOs are carried out by the least mature enterprises including start-ups, their risk should be compensated by higher potential expected return (see e.g. Festel *et al.*, 2013; Ewens & Farre-Mensa, 2022) and, as the result ECF-based IPOs should be more underpriced than IPOs of other companies to attract investors. Salerno *et al.* (2022) emphasize that companies in the early stages of development, such as those often found in the FinTech sector, are characterized by high uncertainty, which increases the required discount level in IPOs. Literature on IPO underpricing phenomenon shows that underpricing may result from a strategic decision aimed at achieving the success of the share issue and obtaining the expected amount of cash from the IPO (see e.g. Bian *et al.*, 2024; Boeh & Dunbar, 2016; Bartling & Park, 2010). The hypothesis [H2] is

rooted in well-established literature dealing with the cyclical nature of IPO markets (see e.g. Dicle & Levendis, 2018; Plotnicki & Szyszka, 2014; Helwege & Liang, 2004; Pagano *et al.*, 1998).

In the article, the statistics for rates of return from the first day in relation to IPO prices are calculated for all companies debuting on the Warsaw Stock Exchange (both Main Market and NewConnect) in 2020–2022 due to the fact that the first ECF-based stock exchange debut appeared in Poland only at the end of 2019. The model for testing the potential determinants of ECF-based IPO performance is based on univariate linear regressions measuring the relationship between a dependent variable which stands for ECF-based IPO underpricing and one independent variable (chosen from a set of potential explanatory variables), which was selected based on the literature.

This article contributes to the literature in two main respects. First, the absolute majority of research on equity crowdfunding concerns its evolution in developed countries. There remains a limited number of studies focusing on equity crowdfunding within developing and emerging regions, Poland included. Taking this into account and the lack of research on the effectiveness of ECF-based IPOs, there is a research gap, which this article is trying to fill. Second, this paper contributes to the extensive literature dealing with the occurrence of the IPO underpricing phenomenon and focuses on a regional study on IPO underpricing of the still niche ECF-based IPOs. To the best of my knowledge, this is the first study to explore the performance of ECF-based IPOs. Although the research focuses on Poland, the results pave the way for further research on ECF-based IPOs worldwide.

The article consists of 5 parts. After the introduction, its second section presents the overview of the literature on equity crowdfunding. The next section presents the development of equity crowdfunding and ECF-based IPOs in Poland. The fourth section evaluates the financial performance of ECF-based IPOs compared to IPOs carried out by other companies in Poland, and the fifth discusses the significance of potential determinants of ECF-based IPOs under- or overpricing. The article ends with a summary that contains conclusions and shows the limitations and weaknesses in the conducted research, the directions of further research, and highlights its potential practical implications.

## Literature review

### *General background*

The equity crowdfunding literature is very rich. Apart from the crucial governance aspects that impact the growth and outcomes of ECF campaigns (Cumming *et al.*, 2023), much of the literature is devoted to the analysis of entrepreneurs' and investors' motivations for using or avoidance of ECF (Blaseg *et al.*, 2021; Troise & Tani, 2021; Estrin *et al.*, 2018) but the beneficiaries of crowdfunding can be not only investors or companies raising capital, but also crowdfunding platforms, providers of technology, micro-payment systems, security systems, and advertisers.

Entrepreneurs gain access to new sources of financing and new investors (Le Pendeven & Schwiendbacher, 2021; Stanko & Henard, 2017). The digital nature of the share purchase process makes it possible to invest in projects that, if only due to their size, would not be taken into account by institutional investors (Troise & Tani, 2021; Wang *et al.*, 2019). Estrin *et al.* (2018) add that ECF allows entrepreneurs to test their products, develop their brand, build a loyal customer base, and turn customers into investors. Investors participating in crowdfunding, apart from the aforementioned expectations regarding profits from dividends and gains from the sale of shares, can often count on material rewards or tax reliefs. For many investors, other than financial satisfaction with the investment may also be important. For platforms and technology providers, the benefits are commissions and other fees.

The main disadvantage of equity crowdfunding is the uncertainty as to the positive ending of the fundraising process. Not all campaigns are successfully completed within the earlier specified time frame. In many countries, there are limits on collection via crowdfunding platforms, which limit the possibilities of raising funds for larger projects. Crowdfunding capital is also associated with costs, which relatively increase in the case of raising funds smaller than expected. The process of raising funds may also be time-consuming and quite complex, requiring the preparation and implementation of a promotional campaign appropriate for ECF, which should reach as many recipients as possible. An advertising campaign requires extensive information about the project, which may be copied by the competition. Another important factor is the possible loss of credibility in the event of failure to achieve the assumed goal.

Many studies were examining the determinants of funding success: the quality of the available human capital (Zhang *et al.*, 2023b, Coackley *et al.*, 2022a; Ahlers *et al.*, 2015), the impact of social networks (Vismara, 2016), investor preferences regarding types of companies raising funds on crowdfunding platforms (Le Pendeven & Schwienbacher, 2021; Chan & Parhankangas, 2017), the method of allocating shares to investors during the campaign (Hornuf & Schwienbacher, 2017), the relevance of due diligence (Cumming *et al.*, 2023), the role of prior financing (Zhang *et al.*, 2023a; Kleinert *et al.*, 2021), and platform characteristics on the ECF campaigns (Vu & Christian, 2024; Coackley *et al.*, 2022a; Rossi *et al.*, 2019; Cumming *et al.*, 2023).

Another strand of research concerns the analysis of the conditions for the effectiveness of crowdfunding. Many of them deal with the issue of reducing the information asymmetry between entrepreneurs and investors. The issues discussed concern the information provided during the campaign on the landing page (Vismara, 2018), the quality and quantity of information provided as part of the pitch process (McKenny *et al.*, 2017), and the dynamics of this process (Estrin & Khavul, 2016).

Other studies concern the characteristics of investors participating in crowdfunding campaigns (Hornuf *et al.*, 2022; Hornuf *et al.*, 2019; Hervé *et al.*, 2019; Block *et al.*, 2018), the awareness of the functioning of the ECF market and its perception by potential investors and other market participants (Tennakoon & Siriwardhana, 2021; Estrin *et al.*, 2018).

From the point of view of this article, an important direction of research is the behavior of companies after a crowdfunding campaign. As noted by Schwienbacher (2019), although a large number of studies focus on crowdfunding campaigns, only a few studies have examined what happened after the campaign is over. Walthoff-Borm *et al.* (2018) in their studies analyzed the failure rate of equity crowdfunded start-ups and they found that they had significantly higher failure rates (17% vs. 2%) than comparable start-ups that did not use equity crowdfunding, based on industry, firm size and firm age. Successive rounds of financing from professional investors were the measure of success in the research by Hornuf *et al.* (2018) and Signori and Vismara (2018). Both studies showed that 1/5 of the crowdfunded British and German start-ups raised followed-up funding from professional investors. Coackley *et al.* (2022b) conducted research on seasoned equity crowdfunding offerings (SECOs) and the factors influencing their success. In their study, they analyzed 709 UK companies that had

successfully carried out initial equity crowdfunding campaigns between 2011 and 2018. Out of these, 105 companies launched their first SECO campaign, with 88 of these campaigns proving successful. The findings revealed that the likelihood of a SECO campaign's success was, among other factors, positively influenced by valuation gains and by broadening investor base between the initial ECF campaign and the SECO campaign. Conversely, the success rate of a SECO was negatively affected by the proportion of equity offered during the initial campaign.

The ability to exit an investment is a critical concern for investors. The presence of a potential exit mechanism greatly influences investment decisions, as it enables investors to cash in on their investments and reinvest the capital into new ventures (Mason *et al.*, 2017). However, Hagedorn and Pinkwart (2016) emphasize that investments resulting from equity-based crowdfunding campaigns typically have a long-term nature. Lukkarinen and Schwienbacher (2023), Vismara (2019) and Cox *et al.* (2019) noticed that although a wide community of investors participates in the capital-raising phase, selling shares acquired through equity crowdfunding on the secondary market can be challenging. This deficiency can significantly reduce investors' willingness to engage in crowdfunding activities.

Early exit options, mergers and acquisitions and initial public offerings represent potential exit options accessible to a broad range of investors. Early exit options are the rights that give investors the choice to withdraw before the end of the contract term. Exiting the investment means their shares are repurchased by the company or by the entrepreneurs. Studies by Bi and Lu (2023) and Hornuf *et al.* (2022) show that while the ability to exit investments early offers flexibility, it may come at the cost of higher ECF prices.

Vanacker *et al.* (2019) and Signori and Vismara (2018) examined what happens to companies after they raise funds through equity crowdfunding, especially when there are no liquid secondary markets for their shares. They found that investors in these companies typically have limited opportunities to cash out their investments, primarily relying on events like mergers and acquisitions (M&As) or initial public offerings (IPOs). However, an analysis by Signori and Vismara (2018) of 212 companies that successfully raised funds on Crowdcube, the UK's leading crowdfunding platform, from its start in 2011 to 2015, revealed that only three companies (about 1.4%) were involved in M&A transactions and none of them underwent an IPO that resulted in a stock exchange listing. Best *et al.* (2013) highlighted



that although IPOs could offer the highest returns for ECF investors, the chances of a crowdfunded business achieving a public listing were minimal in developed nations and even less in developing ones. However, as time has progressed, we've seen examples globally of firms that started with funding from ECF platforms and have successfully listed on stock exchanges<sup>4</sup>. These, however, are rare cases despite many investors pointing out an IPO as the most likely exit (Ahlers *et al.*, 2015). The small number of crowdfunded IPOs may be surprising given that ECF campaigns bear a strong resemblance to SME initial public offerings, especially in so-called alternative markets designed for SMEs, such as the AIM in London (Coakley *et al.*, 2022b; Coakley & Lazos, 2021; Cumming *et al.*, 2021).

#### *The potential determinants of IPO's under- and overpricing*

The theoretical and empirical literature on IPO underpricing is mature and extensive. Miller (1977) attributed the IPO underpricing to the fact that the IPO price is determined based on the average investor's opinion, while the post-IPO price is determined by the estimates of the most optimistic investors. A significant factor that may influence underpricing is the limited supply of shares on the debut day from pessimistic investors, stemming from lock-up agreements and the absence of short-selling opportunities (Patatoukas *et al.*, 2022; Edwards & Hanley, 2010).

On the other hand, another stream of literature consider asymmetry in information to be one of the main factor behind IPO underpricing phenomenon (Rock, 1986; Allen & Faulhaber, 1989; Ritter, 1998; Chen *et al.*, 2015; Chaplinsky *et al.*, 2017; Lowry *et al.*, 2017; Bian *et al.*, 2024). Informed investors are willing to invest in IPOs that they find attractive. The issuing company can make them earn, knowing that their sentiment and future business may depend on the first day return. Uninformed investors who want to buy the shares should accept a higher price than it was proposed in the IPO if positive information about the listed company is revealed before the

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<sup>4</sup> For example, the equity crowdfunding platform Equitise, which has offices in New Zealand and Australia, offers the opportunity to partially crowdfund IPOs on the Australian Stock Exchange (ASX). According to information on their website (<https://www.equitise.com/>), they have successfully raised 4.7 million AUD across 14 IPO offers. Another example is UK-based Augmentum Fintech, which conducted a funding round on the Seedrs ECF platform in February 2018, raising £707,000 from 238 investors towards its IPO. It then proceeded with its IPO in March 2018, raising £95 million ahead of a listing on the London Stock Exchange (LSE)

listing. Uncertainty is also linked to information asymmetries, as investors do not possess the same level of detailed information about a company's prospects as its current owners and managers do. The lack of a public trading history makes it difficult to predict future performance, contributing to uncertainty about the company's valuation.

There is also well-established literature addressing the cyclical nature of the IPO market. Some studies argue that hot markets are a temporary window of opportunity when investors are more optimistic and ready to invest (e.g. Dicle & Levendis, 2018; Helwege & Liang, 2016; Pagano *et al.*, 1998). Fluctuating market conditions can increase uncertainty into the IPO process, affecting investor sentiment and the perceived value of the company (Zhang & Neupane, 2023).

Some researchers attribute this phenomenon to deliberate actions of issuers, underwriters, or institutional investors. For example, the issuers use underestimation of IPO price to reduce their legal liability (Hughes & Thakor, 1992; Lowry & Shu, 2002). They also aim to draw more attention from pre-IPO investors by underpricing their IPOs (Liu *et al.*, 2023). Underwriters specifically lower the issue price because they want to avoid the financial and reputational costs associated with potential inadequate demand from investors (Bartling & Park, 2010; Boeh & Dunbar, 2016; Chen *et al.*, 2022). When institutional investors get involved in the IPO process, they put pressure to reduce and undervalue the IPO price (Ljungqvist & Wilhelm, 2002; Chemmanur *et al.*, 2010; Duong *et al.*, 2022; Bian *et al.*, 2024).

Butler *et al.* (2014) used a large set of variables used in previous studies and tested them on a sample of the US IPOs from 1981 to 2007. They found as many as fifteen out of the forty-eight variables significant to explain the phenomenon of IPO underpricing. These variables represented: economic fundamentals of the offering company (e.g. sales, total assets, total liabilities to assets ratio), process of the IPO (e.g. offer price revision, investment banks engagement, investment bank reputation, selling fee), structure of the IPO (e.g. the ratio of secondary shares retained to shares offered), and stock market situation (e.g. average underpricing in previous 30 days, prior 30 day NASDAQ return, prior 30 day industry return and the standard deviation of industry return). Firm-level characteristic, as industry, firm size, asset turnover, leverage, or profitability, were also analyzed in the context of potential determinants of IPO underpricing by Salerno *et al.* (2022), Chen *et al.* (2022) and Duong *et al.* (2022).

While initial underpricing has been extensively examined, research has largely overlooked the phenomenon of initial overpricing in stock markets, despite some studies providing evidence of its occurrence (Rossovsky *et al.*, 2022; Boulton *et al.*, 2020; Rathnayake *et al.*, 2019; Huang *et al.*, 2018, Purnanandam & Swaminathan, 2004). The most common reason for overpricing, which occurs when the initial offering price of a stock is set higher than its closing price at the end of the first trading session, is a shift in investor sentiment towards the shares purchased in the IPO. Although in theory, this could be caused by a deterioration in the company's economic prospects in the period from the IPO to its debut, due to the typically short time between the IPO and the debut, changes in sentiment towards the IPO-purchased shares should be attributed mostly to a shift in market sentiment, thus an external cause relative to the issuer of the shares. The theory that investor sentiment significantly impacts initial returns is widely discussed in the literature on IPO pricing (Rathnayake *et al.*, 2019; Dicle & Levendis, 2018; Wong *et al.*, 2017; Chan, 2014). If investors anticipate a downturn in the overall market, the initial returns are likely to be lower, which in some cases may lead to overpricing phenomena. The shift from overoptimism to overpessimism is particularly evident when a stock market bubble bursts, transforming a bullish market into a bear market. In hot period, investors are more likely to follow the crowd or "herd" into buying stocks during the IPO without conducting their due diligence, leading to inflated prices and overpricing. Conversely, when investors perceive that a market bubble is bursting, fear of losing capital can prompt them to sell their holdings quickly, without considering the fundamental value of the underlying assets. Rossovski *et al.* (2022) and Francis *et al.* (2001) suggest that longer waiting periods between the day of an IPO and the first day of trading may lead to changes in sentiment, fostering uncertainty about both the future of the IPO company and the stock market conditions.

Based on the theory of behavioral finance and the concept of limited attention, Huang *et al.* (2018) studied investors' attention and overpricing of IPO, suggesting that the decreasing level of investor attention could be a key factor in explaining overpricing. The investors' limited time and attention capacity hinder their ability to efficiently process all available information about stocks, influencing their investment decisions. A lower level of attention might also mean that investors are more influenced by market sentiment and noise rather than by thorough analysis.

Rossovski *et al.* (2022) conducted a thorough empirical study on the phenomenon of IPO overpricing, examining a broad range of firms that entered the public markets in the United States between 2000 and 2020. Their findings revealed that 21.61% of these IPO companies registered negative returns on the day of their market debut. The study pinpointed several critical factors influencing these outcomes. Notably, they found that higher initial offering prices and larger deal sizes both played roles in mitigating the risk of IPO overpricing, primarily by reducing information asymmetries in the case of larger companies. Furthermore, the structure of the IPO process itself was shown to have a considerable effect on the likelihood of negative first-day returns, with IPOs not subject to overpricing more often associated with prestigious underwriters. They also determined that an increased allocation of over-allotment shares markedly decreases the chance of negative returns on the first day. In analyzing the characteristics of overpriced IPOs, they observed that a higher percentage of primary shares, venture capital involvement, and elevated leverage levels all contribute to a reduction in both the frequency and magnitude of IPO overpricing. Additionally, being part of the technology sector was found to significantly reduce the probability of negative first-day returns. Interestingly, their research, however, did not uncover statistical evidence to support the impact of market timing or the influence of agency conflicts on IPO overpricing.

## **Poland as an example of catching up market**

### *Polish economic miracle and financial digitalization*

Following the dissolution of the centralized economic system in Central and Eastern Europe, Poland emerged as a leader in economic growth within Europe (Piatkowski, 2018). Between 1990 and 2022, its real GDP per capita (PPP, measured in current international USD) increased more than sevenfold (from \$6,180.99 to \$46,609.60), which was the result of the second-fastest rate of economic growth in Europe, following Ireland. It's important to emphasize that Poland was the only economy in the European Union to avoid recession during the global crisis of 2008–2009 and had already recovered from the losses caused by the COVID-19 pandemic by 2021.

The Polish model of economic growth was largely based on utilizing foreign investments and increasing the openness of the economy within a stable macroeconomic environment, which was accelerated by its accession to the EU in 2005 (Śliwiński, 2022). However, the gradually slowing productivity growth, along with demographic challenges, indicate that the current development model needs to be adjusted (Piatkowski, 2018). To maintain a faster growth pace, Poland must shift from imitation to independently introducing innovations (OECD, 2023). Poland should particularly direct innovations toward those sectors that offer a chance for rapid development and for achieving regional and global competitive advantage, thereby enabling expansion and entry into new markets. One such sector is Fintech, whose digital nature makes it easily scalable and adaptable to various international markets without the need for building physical infrastructure.

Poland's Fintech ecosystem is relatively young but already significantly developed, positioned for further expansion and becoming a pivotal player in Europe's Fintech landscape, particularly with Warsaw emerging as the Fintech hub of the Central and Eastern Europe (CEE) region (Antal, 2024). The country is recognized as a key center for Fintech and blockchain within the CEE, boasting of a financial sector that ranks among the most technologically advanced worldwide. Polish banks, in particular, are noted for their innovative approaches and leadership in digital transformation, making the nation's financial industry notably more advanced than many others. The banking industry is increasingly forming strategic partnerships with technology providers, underscoring a commitment to innovation, especially in modern payment and banking solutions like contactless payments and the BLIK mobile payment service. Growth sectors like insurtech and crowdfunding have also seen rapid expansion. The COVID-19 pandemic accelerated the banking sector's digitization, from which Poland has greatly benefited. This is evidenced by the Fintech sector's boom in recent years, with the number of Fintech companies in Poland nearly doubling between 2018 and 2022, highlighting the robust development of equity crowdfunding among other areas (Antal, 2024).

#### *Equity crowdfunding and ECF-based IPOs in Poland*

The history of the Polish equity crowdfunding market dates back to 2012 when the first issue was carried out on Beesfund platform for the

amount of PLN 50,000 ( $\approx$  USD 11,400, by 4,38 USD/PLN on the 30th of December, 2022). Although from the 2015 until 2021 year on year the value of capital raised by companies through crowdfunding increased, only in 2019 it was possible to raise over PLN 10 million by companies in more than 20 issues of shares and other ownership securities. Since this year, investment crowdfunding in Poland has significantly accelerated, as shown in the Figure 1.

A significant increase in the number of successful crowdfunding campaigns starting from 2018 was related to the change in the regulations regarding public issues in Poland. Until then, there was a limit of EUR 100,000 for offerings without the need to publish a prospectus approved by the Polish Financial Supervision Authority. In 2018 the threshold below which the obligation to publish a prospectus did not apply was increased to EUR 1 million. In the record year 2021, issuers raised PLN 101,5 million in 65 offers carried out with the participation of the ECF platforms. Importantly, all offers concerned the issue of new shares. The largest issues were close to EUR 1 million.

Crowdfunding equity issues were conducted by companies from various industries, but the largest number of offerings was carried out by issuers from the game industry (7 out of 65 offers in 2021), IT (mobile applications, e-commerce, and software development), the hemp industry and producers of craft alcoholic beverages. Some of these issues closed in less than 10 minutes. Small investors reign supreme on crowdfunding platforms. Average payments on individual platforms in 2021 ranged from PLN 2,200 to PLN 26,100 (UKNF, 2022). In that year, several thousand investors participated in the issues.

In Poland and throughout the European Union, equity crowdfunding has not operated in a stable legal environment in recent years. The diverse principles of operation of crowdfunding platforms in the European Union made it necessary to unify them. On November 10, 2021, the Regulation of the European Parliament and of the Council (EU) on crowdfunding service providers for business ventures entered into force<sup>5</sup>. The regulation regulates the activities of loan and investment platforms in terms of raising capital by enterprises. Particularly important for the development of the

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<sup>5</sup> Regulation (EU) 2020/1503 of the European Parliament and of the Council of 7 October 2020 on European crowdfunding service providers for business, and amending Regulation (EU) 2017/1129 and Directive (EU) 2019/1937 (<https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32020R1503>, access 20/07/2022).

ECF in the EU is (i) the establishment of a new limit for offers of securities that do not require a prospectus in all EU countries, which is to amount to EUR 5 million from 10 November 2023, and (ii) the establishment of a single license for the ECF platforms, which will enable their operation to be transboundary. The EU regulation must be implemented by individual EU countries. The Polish legislator has clarified the regulations and assumed that by November 10, 2023, the limit of no-prospectus offers will be EUR 2.5 million, and after that date, it will increase to EUR 5 million, which results directly from EU regulations. A significant increase in this limit should contribute to the further dynamic development of equity crowd-funding.

Equity crowdinvesting is developing as investors expect rates of return corresponding to the risk of investing in entities at an early stage of development. Every investor needs also to be able to exit the investment at a time convenient for them. Due to legal restrictions, the secondary market for private securities of small companies is not developed and in fact, it does not exist in Poland in principle. Therefore, most companies declare their willingness to go public and allow their investors to make transactions on the NewConnect market.

The NewConnect market is an alternative trading system operated by the Warsaw Stock Exchange. It was created in 2007 for small and medium-sized enterprises with high growth potential and willingness to raise capital for further development. As of December 30, 2022, 379 issuers (375 domestic and 4 foreign) were listed on NewConnect with a total capitalization of PLN 14.5 billion. Most were companies from the video games (67), IT (38), construction (28), investment (23), energy (19) and media (19) sectors.

Trzebiński (2022) examined Polish crowdfunded companies' declarations regarding plans to enable investors to exit the investment. Of the 85 companies<sup>6</sup> that carried out equity crowdfunding campaigns in 2021, as many as 71 declared their willingness to go public and be traded on NewConnect, including 35 by the end of 2022, and another 22 by the end of 2024. Despite such far-reaching announcements of stock exchange debuts, only 19 crowdfunded companies had their IPOs by 30/12/2022, which is only a few percent of all companies that conducted crowdfunding issues in

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<sup>6</sup> The study included crowdfunding campaigns carried out through crowdfunding platforms that reported them to the Polish Financial Supervision Authority, but also other campaigns, including crowdfunding carried out by the companies themselves and the utility tokens offerings, which took place on the Raisemana.com platform.

2012–2021. As many as 13 of them are companies from the game industry, 2 are companies from the renewable energy sources sector and 4 represent different sectors (IT, e-commerce, marketing and advertising, production and sale of footwear). Table 1 shows some information on IPOs of companies that raised capital through equity crowdfunding<sup>7</sup>.

The average rate of return on crowdfunded IPOs was 7,05%, with the median equal to -16,46%. These data, surprisingly, do not indicate the occurrence of underpricing, a fairly common phenomenon in the case of IPOs well described in the literature (Miller, 1977; Helwege & Liang, 2004). Of the 8 positive debuts, the maximum underpricing (potential capital gain) was 118.13%. On the other hand, 11 debuts were in the red, with the highest overpricing (potential capital loss) of 63.34%. With such a range between the max and the min, it is not surprising that the standard deviation of the returns is high at 59.57%. Although the Polish equity crowdfunding market was dominated by three platforms (Crowday, Beesfund and Crowdconnect), 13 out of 19 ECF-based IPOs were carried out with Crowdconnect<sup>8</sup> and brought to the NewConnect by INC acting as an Authorized Advisor<sup>9</sup>.

### **Study of determinants of crowdfunding IPOs' first day returns**

#### *The first day returns of IPOs in Poland in 2020–2022 — preliminary research*

In the three-year period (2020–2022), 79 new companies made their IPOs and went public in Poland. As many as 62 (78,5%) of them debuted on NewConnect, while 17<sup>10</sup> (21,5%) entered the Main Market, which is the

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<sup>7</sup> The rates of return were calculated as the percentage change in the price of the shares offered in the crowdfunded IPO and the closing price of the first trading day.

<sup>8</sup> Crowdconnect was the only ECF platform in Poland which is run by a licensed brokerage house (Dom Maklerski INC owned by INC) and therefore it was under constant supervision of the Polish Financial Supervision Authority. Its name (crowd + connect) emphasizes a symbiosis between equity crowdfunding and NewConnect in Poland.

<sup>9</sup> Pursuant to the NewConnect Alternative Trading System Rules, an Authorized Adviser is an investment firm or another entity being a commercial law company providing services related to economic activity, including financial consulting, legal advice or financial audit related to the NewConnect market, and which is registered by the Warsaw Stock Exchange.

<sup>10</sup> In the period 2020–2022, 31 companies debuted on the WSE Main Market, 14 of which changed their listing from NewConnect to the WSE Main Market. Although two of them made share issues preceding the change of the quotation market, these issues are treated as SPOs for



Warsaw Stock Exchange's regulated market. More than every fourth (18 out of 62) debuted on NewConnect, and more than every fifth in Poland (18 out of 79) were preceded by a crowdfunding offer, which means that ECF became an important source of financing for companies going public in Poland.

Table 2 shows the comparison of statistics on the rates of return potentially earned by investors on IPOs during the first trading session in Poland in the period from 01/01/2020 to 30/12/2022.

Based on the data shown in the Table 2, the following conclusions can be drawn:

- Investors participating in crowdfunding IPOs could earn on average 7,00% on the first trading day (closing prices), less than investors investing in the IPOs of companies heading to the WSE (16,56%), but much less than in the case of IPOs of non-crowdfunded companies from the SME sector that debuted on NewConnect (70,95%).
- While the calculated average return for IPOs at their first trading days was positive, which may indicate an underpricing phenomenon in 2020-2022, most companies debuted on NewConnect with negative returns. An average rate of return visible on the Polish IPO market was very volatile. The standard deviation of returns in the case of the debuts preceded by a crowdfunding issue was 8,74 times higher than the average rate of return. Although the volatility coefficients are lower for the remaining IPOs on NewConnect (2,34) and IPOs on the WSE's Main Market (2,14), they still show a high risk related to investments in IPOs on the Polish market in the analyzed period.
- As already mentioned, investing in companies at an early stage of development through ECF was associated with high risk. More than half of the companies (11 out of 18) did not allow investors to earn on the first trading day, in the case of Hydra Games the potential loss was over 63%, and in three other cases, the loss was over 50%. Of the remaining companies debuting on NewConnect, almost 2/3 ended their first day of trading at a loss compared to the price offered in their IPOs. For the Main Market, the majority of companies debuted in green. However, all of them did it in 2020–2021.
- Investing in an IPO could also bring above-average gains. In the case of ECF-based IPOs, three game companies gave over 100% return on their first trading days. Such rates of return could not be achieved in the case

of the Main Market. In the case of debuts on NewConnect, which were not preceded by crowdfunding, 11 companies gave more than 100% return on the debut. The record holder was genXone with a rate of return on its debut equal to 761.90%, a company from the biotech industry<sup>11</sup>.

When analyzing the statistics, a question arises about the underperformance of ECF-based IPOs in relation to other IPOs in Poland. According to the stylized fact that higher returns are associated with higher risk and vice versa, higher rates of return should be expected in the case of investments in ECF-based IPOs, especially compared to investments in IPOs on the WSE's Main Market. However, this is not so. In the case of ECF-based IPOs, the standard deviation is almost twice as high although the average rates of return is much smaller. As the result, the investors who invested in small companies, often still startups, did not receive a fair risk premium. Why? Is this a regularity in Poland, or maybe there is another factor that influenced such results?

#### *Research method*

The research group includes all stock market debuts of companies that carried out ECF-based IPOs using equity crowdfunding platforms in Poland until the end of 2022. The potential ECF-based IPO underperformance will face IPOs of other companies debuting on NewConnect and the WSE Main Market in 2020–2022<sup>12</sup>. The choice of the research period was influenced by the fact that, with the exception of one debut in 2019, all the others took place after that year. The data source is WSE yearbooks, 2020–2022 and [www.stooq.pl](http://www.stooq.pl).

The research tests two hypotheses describing the performance of ECF IPOs in Poland:

*Hypothesis [H1]: ECF-based IPOs are more underpriced than IPOs of other companies to attract investors to buy shares offered with the use of equity crowdfunding.*

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<sup>11</sup> By the way, the ECF campaign carried out by genXone at the end of 2019 was not successful due to the insufficient amount of subscriptions.

<sup>12</sup> The analysis does not include those companies that changed the quotation market and moved from NewConnect to the WSE Main Market. For almost all of them, it was a technical process that did not involve the issue of new shares.

Hypothesis [H2]: *The effectiveness of ECF-based IPOs has mainly the cyclical nature and it depends on stock price cycle.*

The rates of return on the first trading day (IPO underpricing) were calculated as follows:

$$\text{underpricing} = \frac{\text{first day closing price} - \text{IPO price}}{\text{IPO price}} \quad (1)$$

The model for testing the possible determinants of ECF-based IPO underpricing is based on univariate linear regressions measuring the dependent variable, which is ECF IPO underpricing, and one independent, explanatory variable selected from among the hypotheses formulated in the paper and literature<sup>13</sup>. Similar approach was used by Śliwiński *et al.* (2022).

Based on the dataset of dependent variables  $y_i$  and explanatory variables  $x_i$ , a simple linear regressions were used:

$$y_i = \alpha + \beta x_i + \varepsilon_i \quad (2)$$

where  $\varepsilon_i$  is the random component of the regression and  $x_i$  represents a dataset of  $i$  independent variables associated with the following possible determinants of ECF-based IPO underpricing: (i) ECF-based IPO amount, (ii) market capitalization of the company, (iii) value of the shares introduced to the trading, (iv) value of free-float admitted to the trading, (v) game or no-game group (zero-one variable), (vi) mature or start-up company (zero-one variable), (vii) P/E ratio, (viii) P/Sales ratio, (ix) time of ECF-based IPO, (x) values of NCINDEX, WIG\_GAMES and WIG on the first trading session, (xi) changes in NCINDEX, WIG\_GAMES and WIG for four periods: change in the index price on the debut day [t], the closing price on the debut day compared to the previous day close [t/t-1], change in the closing price on the debut day compared to the close from 7 trading sessions before [t/t-7], change in the closing price on the debut day compared

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<sup>13</sup> The explanatory variables can be divided into 4 groups: economic fundamentals (mature of the company, P/E and P/Sales ratios, and market capitalization), industry (game or no-game), structure of IPO (the value of IPO, value of shares admitted to trading, value of free-float admitted to trading), and stock market situation: (the values of NCIndex, WIG\_Games, and WIG indices at the time of the debut (closing prices), change of the closing prices of NCIndex, WIG\_Games, and WIG indices on the first trading day compared to the close from 1, 7, 30, and 90 trading sessions before).

to the close from 30 trading sessions before [t/t-30], and change in the closing price on the debut day compared to the close from 90 trading sessions before [t/t-90]. The OLS (Ordinary Least Squares) model was used to estimate the parameters  $\alpha$  (constant term) and  $\beta$  (coefficient term).

## Results

Although the first hypothesis [H1] assumes that ECF-based IPOs are underpriced compared to IPOs of other companies to attract investors to buy shares offered through ECF crowdfunding, the preliminary statistics (Table 2) showed that in 2020–2022 ECF-based IPOs were less effective than IPOs carried out by other companies in terms of mean, median and coefficient of variation. The average return on ECF-based IPO debuts on NewConnect indeed showed underpricing at the level of 7% (on the Main Market it was 16.56%, and for other debuts on NewConnect: 70.95%), but the median already indicated overpricing of ECF-based IPOs (-18.22% compared to 6.67% on the Main Market and 13% for non-ECF IPOs on NewConnect). When including the volatility of returns from stock market debuts measured by standard deviation in the analysis, it turns out that the coefficient of variation, which measures the ratio of standard deviation to return, was the highest (and thus the least attractive) for ECF-based IPOs. In the case of ECF-based IPOs, there were as many as 8.74 units of risk per one unit of return, while for the Main Market it was 2.14, and for non-ECF-based IPOs on NewConnect it was 2.34. But does this really make ECF-based IPOs the least attractive IPOs on the market?

The results of the regressions presented in Table 3 help solve this puzzle<sup>14</sup>. They show that the main determinant of ECF-based IPO underpricing level was the time in which these IPOs were carried out. If we compare the dates of their debuts (Table 1) and the behavior of the stock exchange indices (Figure 2), we can see that almost all profitable ECF-based debuts took place in the upward market<sup>15</sup>. After a change in the stock market trend, all

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<sup>14</sup> *T*-statistics to test whether the coefficient is statistically equal to zero are placed in parentheses, and *p*-values are marked with asterisks depending on the level of significance (\*\* -  $p < 0,01$ , \* -  $p < 0,05$ , \* -  $p < 0,10$ ).

<sup>15</sup> The study on the determinants of ECF-based IPO underpricing in the bull market showed that the only variable that was significant ( $p < 0.1$ ) was the change in the WIG\_Games index (t-1/t). It should be remembered that only 1 in 10 debutants was not a game company in this period. The rate of return on the first trading day was first of all determined by behavioral

debuts, in turn, gave a loss to investors who invested in ECF-based IPOs. The peak of the stock market situation fell in different periods depending on which index is analyzed:

- For game companies (where the WIG\_Games is the barometer of the economic situation of the game sector), it was the second half of 2020;
- On the NewConnect market, the peak of quotations was in fact in mid-2020, but the economic downturn occurred only in the fourth quarter of 2021;
- The second half of 2021 also meant a change from an upward trend to a downward trend for companies listed on the Main Market of the Warsaw Stock Exchange (WIG and WIG-20 are the main indices of the WSE Main Market).

As all the ECF-based companies debuted on the NewConnect and majority of them were game companies (13/19), it is not surprising that their IPO performances were also determined by the level of NCIndex and WIG\_Games. The other tested dependent variables turned out to be insignificant. The results of regressions show the cyclical nature of ECF-based IPO underpricing level.

To verify the second hypothesis [H2] assuming that the effectiveness of ECF-based IPOs has mainly the cyclical nature and it depends on stock price cycle, apart from the regression analysis presented above, efficiency of ECF-based IPOs versus IPOs carried out by other companies which debuted on the NewConnect and the WSE Main Market was tested once again. This time, however, in addition to the IPOs' effectiveness study for the entire period, a study was carried out for the period before the downturn on the NewConnect market (01.01.2020–30.09.2021) and after it (01.10.2021–31.12.2022). The results are presented in Table 4.

Table 4 shows two interesting things. First, it confirms the cyclicity of IPO underpricing [H2]. In the boom period, the phenomenon of IPO underpricing is common, regardless of what was the source of the initial offer or where the company was listed. During the stock market slowdown, IPOs were often overpriced. All the medians in that period were negative. This applies both to debuts on NewConnect and on the Main Market of the

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factors. In turn, in the bear market, the larger the issue amount the smaller ECF-based IPO overpricing ( $p < 0.1$ ). This can be explained by the fact that institutional investors appear in larger IPOs and do not react as emotionally as individual investors to market shocks. They invest with a longer time horizon, and they can treat lower than IPO prices as investment opportunities. Thus, they reduce the scale of IPO overpricing.

Warsaw Stock Exchange, and both to ECF-based and non ECF-based IPOs. Second, the differentiation of the effectiveness of stock exchange debuts proves helpful in verification of hypothesis [H1]. As illustrated in Table 4 and in Figure 3, the effectiveness of IPOs differs in the bull and bear markets.

In bull markets, ECF-based IPOs were characterized by a higher median level, a higher share of profitable debuts than negative ones, and a better coefficient of variation, which indicates the risk-reward ratio, than other debuting companies. As the stock market fell, ECF-based IPOs proved to be the least effective. Only one in ten IPOs were underpriced and the median was -32,39% (overpricing). All this confirms partly the hypothesis [H1] that ECF-based IPOs are underpriced compared to IPOs of other firms, but only in growing markets. Helwege and Liang (2004) noted that hot markets reflect greater investor optimism, cold markets, in turn, are associated with mass pessimism. As individuals herd more strongly towards the market, it translates into very high volatility of ECF-based IPOs returns. This behavioral factor undoubtedly influenced the rate of returns on all crowd-funded IPOs which differed from expectations in the analysis of the whole period which included both bull and bear markets. Why is this happening?

## **Discussion**

The empirical results confirmed partially hypothesis [H1] that ECF-based IPOs are more underpriced than IPOs of other companies to attract investors to buy shares offered with the use of equity crowdfunding. However, this phenomenon of ECF-based IPO underpricing can be observed in a bull market, and it diminishes with the deterioration of the stock market situation. Underpricing in times of market growth of ECF IPOs averaged 51.26% (median 49.88%) and was particularly significantly higher than on the main market (mean = 23.38%, median = 11.70%). Also, debuts of non-ECF-based companies on the NewConnect market had a much lower median than ECF debuts (18.33%), but with a higher mean, which was 67.08%.

Companies offering their shares in equity crowdfunding compete with other going public companies. As they are usually smaller companies with a shorter operating history, often even start-ups, they choose ECF platforms to offer shares in order to reach the widest possible group of potential investors. By underpricing their ECF-based IPO, companies aim to in-

crease investor interest and demand, which can lead to a successful offering and a positive reception in the market. Generally, the underpricing of ECF-based IPOs can be analyzed from two main perspectives: investment attractiveness, described by the expected return and associated risks, and the company's development strategy, utilizing successive funding rounds.

First, the greater underpricing observed in ECF-based IPOs during times of a bullish market is associated with the fact that investments in companies raising capital through ECF are linked with greater uncertainty. The companies analyzed in the article, which conducted their ECF-based IPOs, belonged in most cases to the FinTech & Gaming sector and were predominantly young startups. The challenge in estimating fair value for this kind of ventures stems from their minimal tangible assets, the lack of abundant historical data and limited early-stage earnings, making them uncertain investments (Salerno *et al.*, 2022). Various research underscores the role of IPO-related uncertainty in leading to underpricing, a phenomenon more commonly documented among tech firms compared to those in more established sectors (Salerno *et al.*, 2022; Karlis, 2000).

The more pronounced underpricing of ECF-based IPOs especially relative to those listing on the Main Market of the Warsaw Stock Exchange (WSE) can also be attributed to the companies' size. These companies are often too small to be considered for inclusion in the portfolios of large institutional investors. Companies listed on the Main Market generally adhere to more stringent requirements, enhancing their visibility and, consequently, liquidity. In contrast, companies after ECF-based IPOs, due to their smaller size, might suffer from lower liquidity, which could necessitate greater underpricing to offset the increased risk perceived by investors. The Main Market imposes rigorous listing criteria that assure a degree of company maturity, financial health, and transparency. Companies that satisfy these criteria are likely perceived as lower-risk, thus mitigating the necessity for substantial underpricing. On the other hand, companies listed on NewConnect have more relaxed criteria, catering to less mature or smaller companies<sup>16</sup>. Summing up, the institutional investors perceive smaller companies listed through ECF-based IPOs as riskier investments compel-

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<sup>16</sup> Entering the Main Market in Poland requires approval of the prospectus by the Financial Supervision Authority, while entry to the alternative NewConnect market requires the approval of an information document by the Warsaw Stock Exchange. The information document is generally less comprehensive than a prospectus. It still provides essential information about the company and its securities but is tailored to the needs of a market segment that is usually more accessible for smaller, growth-oriented companies.

ling them to attract interest from retail and smaller investors through lower initial pricing.

Second, the smaller scale of ECF companies signifies their reliance on external financial support for further development of their operations. Since, as a rule, a ECF-based IPO secures their financial needs only in the short term, and issuers assume further seasoned offerings (SPO) in the future. This is supported by research on seasoned equity crowdfunding offers (SECO), which indicates that an increase in valuation of ECF-financed company corresponds to a greater likelihood of conducting a SECO (Coackley *et al.*, 2022b). Entering the stock exchange is intended to open up cooperation with the capital market. Thus, a higher underpricing can help companies build relationships with investors, as they benefit from any initial price increase after the IPO. This can help companies build a loyal investor base for future offerings. By setting the price in the IPO, they want to avoid the risk of overpricing, which can lead to a lack of interest from investors and a negative perception of the company in the market. Van Bommel and Vermaelen (2003) showed that companies with higher returns on the first trading day comparing to the IPO price raised more capital for investments after their IPOs.

The research supported the second hypothesis [H2], suggesting that the effectiveness of ECF-based IPOs is predominantly cyclical, closely tied to the fluctuations in stock price cycles. The study indicated that market conditions were essentially the sole factor that significantly influenced the outcomes of ECF-based IPOs. These findings diverge from those of Rossovski *et al.* (2022), who examined negative IPO performances (overpricing) across a broad dataset of companies listed in the USA from 2000 to 2020. They were unable to identify statistical support for the impact of market timing on the overpricing of IPOs. They inferred that other universal attributes affect both IPO underpricing and overpricing, including the size of the IPO, the size of the offer, and whether the company belongs to the technology sector.

When comparing this study with that of Rossovski *et al.* (2022), it's important to note that they investigated the phenomenon of overpricing among much larger IPOs than in this research, which significantly involved institutional investors<sup>17</sup>. In contrast, ECF-based IPOs predominantly attract individual investors who, unlike their institutional counterparts, tend to

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<sup>17</sup> Cumming *et al.* (2021) noticed that the majority of IPOs have been offered exclusively to institutional investors, whereas crowdfunding investors are much more diverse.



invest more on an emotional basis. Individual investors constitute the absolute majority of crowdfunding investors in Poland. The NewConnect market is also dominated by them. Their share in the stock exchange turnover is over 90%. Institutional investors, like venture capitalist and private equity participation in the IPO reduces the probability of overpricing (Rossovski *et al.*, 2022). Literature shows that individual investors differ in their behavior from institutional investors, e.g. in herding when investors imitate and follow other investors' decisions (Li *et al.*, 2017). Vismara (2019) observed that this pattern of behavior is also present in crowdfunding: professional investors adhere to market logic even when investing in crowdfunding platforms, while small, unsophisticated investors tend to be guided by community logic.

An additional factor distinguishing the studies under analysis is the period from the IPO to the stock market debut. Francis *et al.* (2001) suggest that longer waiting periods introduce greater uncertainty about the prospects of the IPO company, which can in turn increase the likelihood of overpricing. The problem with ECF-based IPOs in Poland is the long time it takes from crowdfunding IPOs to debut in Poland, which takes 6–12 months on average. Although the inertia in share issues of companies targeting NewConnect is also quite high, it is usually several months shorter than when they raise money through crowdfunding platforms. The problem with IPOs preceding the debut on NewConnect, and in particular ECF-based IPOs, is that they often take place in the bull market, when companies see their high valuations and high interest of investors. Stock market debuts, however, can take place after the end of a good economic situation. This was the case in the analyzed period of 2020–2022. Unlike the debuts of larger companies on the WSE Main Market, ECF-based and non ECF-based companies' first trading days on NewConnect occurred throughout the entire period of the analysis, regardless of the stock market condition. Due to the big decline in the WIG index at the turn of 2021 and 2022, the WSE Main Market had only 3 new companies in the last quarter of 2021 and no new IPOs in 2022. This is because large company IPOs have a shorter time from IPO to the first day of trading (typically within a few weeks). The Main Market investors are mostly institutional investors who, in case of a bad economic situation, simply do not want to invest in IPOs, that is why the IPO market of large Polish companies almost dies at such a moment<sup>18</sup>.

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<sup>18</sup> Meluzin *et al.* (2018) demonstrate that the business cycle has a direct impact on the IPO activity in the Polish capital market.

Therefore, we do not observe large negative returns from debuts on the WSE Main Market, unlike NewConnect.

## **Conclusions**

Along with the change in regulations and the growing awareness, equity crowdfunding has become the object of interest of an increasing number of entrepreneurs and investors. Since 2018, the continuous development of this form of SME financing can be observed in Poland. It manifests itself in an increasing number of crowdfunded companies, equity crowdfunding issues, raised capital, a greater number of investors, and a growing number of crowdfunding platforms.

The article shows that since 2020 equity crowdfunding has become an important source of financing for crowdfunded companies going public in Poland. Every fourth NewConnect debutant has carried out its IPO using crowdfunding platforms.

Crowdfunding debutants on NewConnect are usually start-ups. Out of 15 companies, only Zeneris from the RES industry had a longer history. Many companies in this group are start-up game companies. Most of their games, made with the use of crowdfunding funds, had their premieres after the first trading days. So crowd-investors invested in the expected future of crowdfunded companies, but the same was true for investors who bought the shares from them during the first trading session. In many cases, due to the lack of financial results, investment decisions had to be based on emotions, and these were influenced by the stock market situation.

The most important finding in the paper is that the effectiveness of ECF-based IPOs has mainly the cyclical nature and it depends on stock price cycle. As the timeline of debuts had certainly a big influence on the presented statistics of ECF-based IPOs' effectiveness, the paper revealed that ECF-based IPOs were more underpriced than other IPOs in the bull market, while in the bear market they were more overpriced. As previously indicated, this stems from the characteristics of investors on crowdfunding platforms, who are predominantly individual rather than institutional investors.

To the best of my knowledge, this is the first study examining the performance of equity crowdfunded IPOs. In considering the conclusions from the research, it's important to acknowledge some limitations of this study.

First, the history of crowdfunding companies making their stock market debut is relatively short. Second, the research focused exclusively on a single country within the rapidly developing group of emerging economies. The capital market in Poland has its unique features, primarily characterized by a well-functioning alternative market tailored to SMEs with low entry barriers. Third, the number of companies that have conducted ECF-based IPOs is only 18, hence the research group is not large. Furthermore, the ECF-based IPOs occurred in a very specific period, in which, on the one hand, there was a covid boom, during which the NewConnect index climbed more than 200% just in five months, but on the other — a period of a downturn, in which until 31/12/2022 the NCIndex index plunged exactly 50% from its peak. Nevertheless, the findings open up a new scientific avenue regarding the study of ECF-based IPOs. It should be assumed that over time there will be an increasing number of such IPOs in various countries, which will enable the analysis of a larger group over a longer period. This, in turn, will also allow for the comparison of their effectiveness in an international dimension.

This article is an introduction to further research on the effectiveness of crowdfunding IPOs. Due to the start-up nature of debuting companies, it is also important to analyze also the behavior of their prices after the first trading day. This is especially relevant given that it often happens that the funds raised in crowdfunding campaigns affect their financial results only after some time after their debuts on the stock exchange. Another direction of research will be therefore the analysis of crowdfunded listed companies' performances after their debuts on the stock exchange to answer the question on the differences in the long-run performance of overpriced and underpriced IPOs.

The research conducted in the article can also have significant practical value. Crowdfunding platforms, acting as underwriters that promote and distribute shares, assist in meeting regulatory requirements and set the share price for the ECF-based IPOs, as noted by Cumming *et al.* (2022), play a pivotal role in democratizing equity investment and simplifying the investment process for individuals. Retail investors are ultimately seeking returns, traditionally achieved through exit strategies like being acquired by another entity or undergoing an IPO. Without successful examples of equity crowdfunded companies being acquired for a profit or conducting profitable IPOs, interest in crowdfunding from investors may decrease. A strategy that could mitigate underpricing is to increase the participation

of institutional investors. This can be achieved e.g. by integrating equity crowd-funded IPOs with traditional IPO book-building processes to engage large investors before launching the crowdfunding campaign, while setting the fixed price once the offer is listed on the crowdfunding platform. The article also underscores the importance of conducting faster debuts post-IPO to minimize the time gap between ECF-based IPO and the first day of trading.

It should be assumed that ECF-based IPOs will continue to evolve across various countries. It's also plausible to expect collaborations between brokerage houses, investment banks acting as underwriters, and equity crowdfunding platforms in the market. Underwriters will see in ECF-based IPOs a way to establish relationships with promising issuers, for whom the ECF-based IPO will essentially serve as a pre-IPO on an alternative market—before transitioning to a regulated market. These issuers may later seek seasoned offerings or a significant IPO associated with their debut on regulated markets.

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## Annex

**Table 1.** Characteristics of crowdfunding IPOS in Poland (2019–2022)

Month of debut	Sector	Company	Rate of returns on the first trading day	ECF platform*	Authorized Advisor	Issue amount (in PLN)
09.2019	Games	Red Dev Studio	+7,89%	Findfunds	Blue Oak Advisory	216 759
01.2020	E-commerce	Plantwear	+72,73%	Crowdconnect	INC	1 500 464
08.2020	Games	Polyslash	+114,29%	Findfunds	Blue Oak Advisory	2 142 000
09.2020	Games	Duality	+118,13%	FundedBy Me	Blue Oak Advisory	1 709 741
12.2020	Games	Detalion Games	+63,27%	Crowdconnect	INC	1 375 000
01.2021	Games	United Label	+10,94%	Crowdconnect	INC	4 400 000
02.2021	Games	Incuvo	+115,24%	Crowdconnect	INC	2 800 004
02.2021	Games	Atomic Jelly	+29,79%	Findfunds	Abistema	2 442 000
04.2021	Games	Drago Entertainment *	-11,01%	Crowdconnect	INC	2 002 000
08.2021	Games	Punch Punk*	-51,02%	Crowdconnect	INC	1 500 000
11.2021	RES	Zeneris Projekty	-27,86%	Crowdconnect	INC	3 000 031
12.2021	Games	Iron Wolf Studio	-42,91%	FundedBy Me	Blue Oak Advisory	1 593 000
12.2021	Games	Render Cube	-20,07%	Crowdconnect	INC	3 885 000
01.2022	Games	Road Studio	-19,98%	Crowdconnect	INC.	2 000 000
02.2022	Games	Hydra Games	-63,34%	Crowdconnect	INC	1 500 000
04.2022	RES	BeeIN	-36,92%	Crowdconnect	INC	4 000 000
10.2022	Software	Emplocity	-52,73%	Crowdconnect	INC	1 439 900
11.2022	Clothing/footwear	Kubota	-16,46%	Crowdconnect	INC	2 499 991
12.2022	Marketing/advert.	Bridge Solutions Hub	-56,00%	Beesfund	Prosper Capital DM	916 540
	<b>Mean</b>		<b>7,05%</b>		<b>Mean</b>	<b>2 153 812</b>
	<b>Median</b>		<b>-16,46%</b>		<b>Median</b>	<b>2 000 000</b>

Note: \* Two companies carried out two share issues on two different equity crowdfunding platforms: Drago Entertainment (Smartfunds and Crowdconnect) and Punch Punk (Findfunds and Crowdconnect). For these companies, the table shows the stock issues directly preceding the stock exchange debuts (ECF-based IPO).

Source: Own elaboration based on [www.stooq.pl](http://www.stooq.pl) (10.01.2023).

**Table 2.** Performance of IPOs in Poland in 2020–2022

	NewConnect (ECF-based IPOs)	NewConnect (non ECF-based IPOs)	NewConnect (all IPOs)	Main Market
Mean	+7,00%	+70,95%	+52,56%	+16,56%
Median	-18,22%	+13,09%	+ 8,50%	+6,67%
Max	+118,13%	+761,90%	+761,90%	+98,34%
Min	-63,34%	-62,92%	-63,34%	-37,50%
Standard deviation	61,20%	165,69%	146,12%	35,37%
Coefficient of variation	8,74	2,34	2,78	2,14
Debuts in the plus	7	17	34	10
Debuts in the minus	11	27	28	7
Number of IPOs	18	44	62	17

Source: Own elaboration based on [www.stooq.pl](http://www.stooq.pl) (10.01.2023).

**Table 3.** Regressions results of ECF-based IPOs performances

Regressors	$\beta$ coefficients
IPO amount	9,54E-09 (0,069447)
Marketcap	-4,02E-09 (-0,943944)
The value of the shares admitted to the trading	-2,96E-09 (-0,677764)
The value of free-float admitted to the trading	-1,31E-08 (-0,640657)
Game (1) vs non-Game (0)	0,3888656 (1,312261)
Mature (1) vs start-up (0)	-0,384124 (-1,349473)
P/E ratio	-0,468071 (0,1467)
P/Sales ratio	-0,0034558 (-0,748752)
<b>Time of IPO</b>	<b>-0,001287 (-4,069345)***</b>
<b>NCIndex at t</b>	<b>0,002840 (2,208574)**</b>
<b>WIG_Games at t</b>	<b>4,24E-05 (2,372044)**</b>
WIG at t	1,42E-05 (0,022968)
dNCIndex t/t-1	14,27981 (1,613309)
dWIG_Games t/t-1	7,358303 (1,477041)
dWIG t/t-1	-3,755490 (-0,319659)
dNCIndex t/t-7	4,988576 (1,604983)
dWIG_Games t/t-7	-0,763659 (-0,170971)
dWIG t/t-7	-3,167633 (-0,574767)
dNCIndex t/t-30	0,844275 (0,558873)
dWIG_Games t/t-30	-0,041862 (-0,028594)
dWIG t/t-30	-2,655551 (-1,364837)
dNCIndex t/t-90	1,888996 (1,251881)
dWIG_Games t/t-90	-0,831116 (-0,831477)
dWIG t/t-90	0,201314 (0,171419)

Source: Own elaboration based on [www.stooq.pl](http://www.stooq.pl) (10.01.2023).

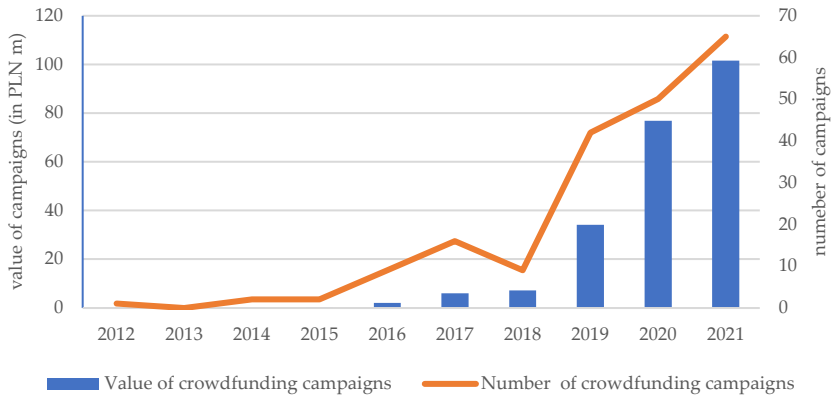
**Table 4.** Characteristics of the first offers rate of returns from the gaming and all sectors

Research group	Statistics	01.01.2020-31.12.2022	01.01.2020-30.09.2021	31.09.2021-31.12.202
NewConnect (ECF-based IPOs)	In plus	7	6	1
	In minus	11	2	9
	Min	-63,64%	-51,02%	63,34%
	Max	118,13%	118,13%	63,27%-
	Median	-18,22%	51,26%	-32,39%
	Mean	7,00%	49,88%	-27,30%
	Standard dev.	61,20%	60,63%	33,96%
	CV	8,74	1,22	-
NewConnect* (non-ECF-based IPOs)	In plus	25	18	7
	In minus	17	7	10
	Min	-62,92%	-16,67%	-62,92%
	Max	423,50%	423,50%	125,00%
	Median	13,08%	18,33%	-13,39%
	Mean	41,43%	67,08%	3,71%
	Standard dev.	96,67%	109,73%	54,66%
	CV	2,33	1,64	14,75
NewConnect* (all IPOs)	In plus	32	25	7
	In minus	28	9	19
	Min	-63,34%	-39,97%	-63,34%
	Max	423,50%	423,50%	125,00%
	Median	7,19%	18,43%	-26,71%
	Mean	31,29%	63,25%	-10,51%
	Standard dev.	88,80%	98,49%	49,28%
	CV	2,84	1,56	-
Main Market	In plus	10	9	1
	In minus	7	4	3
	Min	-37,50%	-37,50%	-17,35%
	Max	98,34%	98,34%	3,04%
	Median	6,67%	11,70%	-3,42%
	Mean	16,56%	23,28%	-5,28%
	Standard dev.	35,37%	37,76%	7,58
	CV	2,14	1,62	-

Note: \* Excluded were two companies which debuted on NewConnect: genXone and Spyrosoft, which represented outliers. Biotech company genXone, which e.g. makes tests for COVID-19, had a return of 523.2% in August, 2020, when debuting on NewConnect in the COVID-19 pandemic. In the case of Spyrosoft, 620.0% underpricing results from a specific IPO made at non-market prices and aimed only at employees in the amount of PLN 100,000.

Source: Own elaboration based on [www.stooq.pl](http://www.stooq.pl) (10.01.2023).

**Figure 1.** Value and number of successful crowdfunding campaigns in Poland 2012–2021



Source: Own elaboration based on Trzebiński (2022).

**Figure 2.** The behavior of the chosen WSE indices from 2019 till the end of February 2023

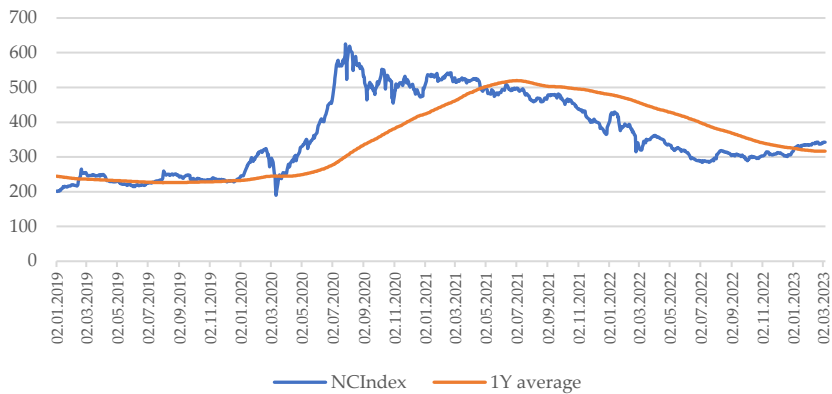
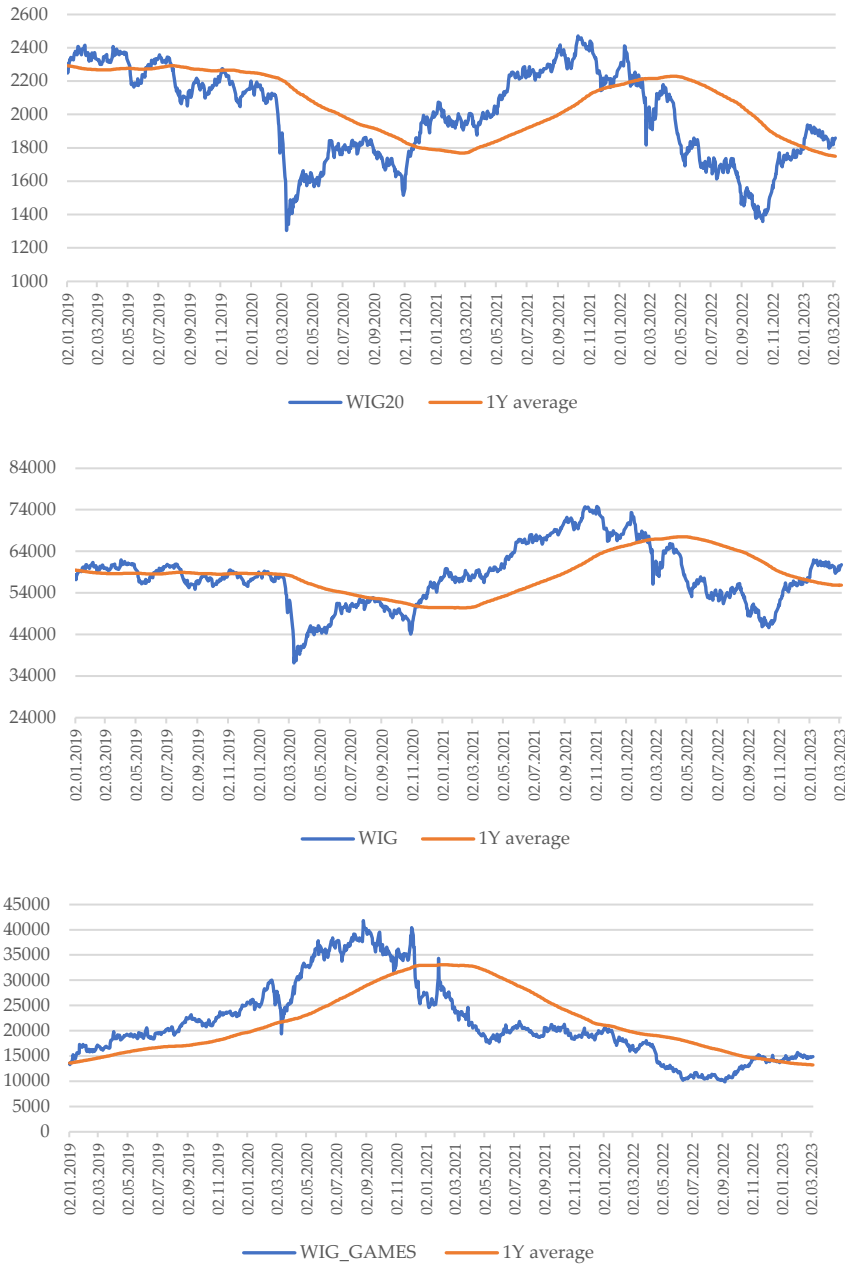


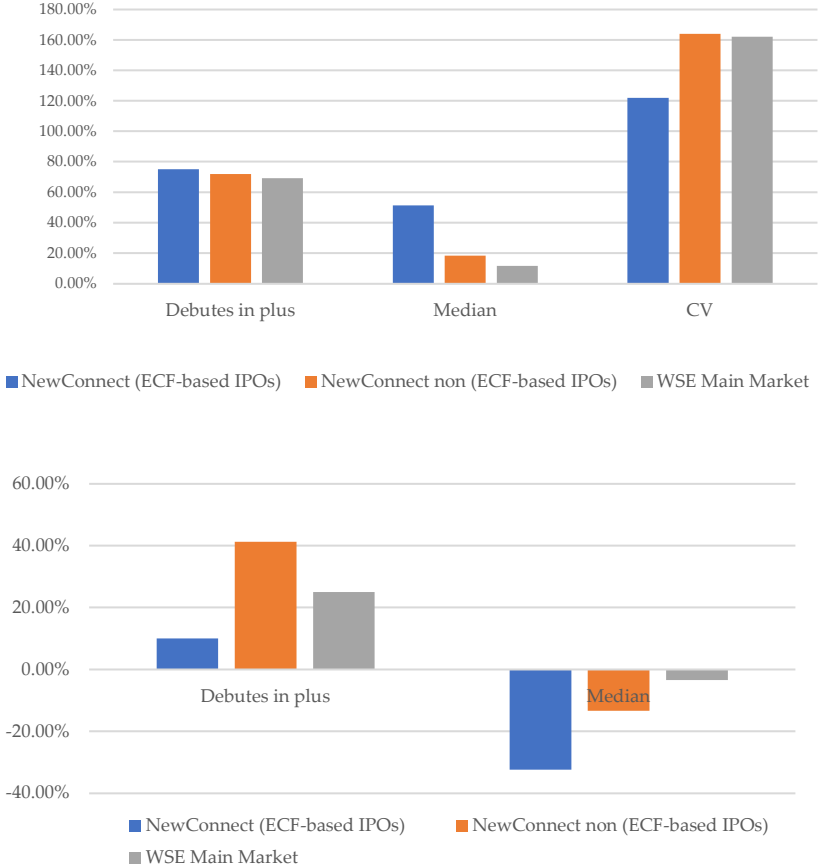
Figure 2. Continued



Source: Own elaboration based on [www.stooq.pl](http://www.stooq.pl) (02.03.2023).



**Figure 3.** Effectiveness of IPOs in the bull and bear periods (01.01.2020–30.09.2021)



Source: Own elaboration based on [www.stooq.pl](http://www.stooq.pl) (10.01.2023).