

## POST-IPO INNOVATIVE FIRM PERFORMANCE

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**Purpose:** The aim of the work was to present the impact of IPO on the innovation and economic results of companies debuting on the Warsaw Stock Exchange.

**Design/methodology/approach:** The aim of the work was achieved by analyzing the literature and conducting research on companies debuting on the WSE. Descriptive statistics, the Shapiro-Wilk normality test and the Student's t-test or Wilcoxon test were used for the study.

**Findings:** The obtained results confirm that IPO has a negative impact on the economic results of companies debuting on the WSE. It is noted that innovative activities by companies mitigate the negative effect of IPO.

**Originality/value:** The presented problem is of great practical importance. The research results may prove useful for people managing enterprises and responsible for shaping the innovative activities of enterprises and the methods of financing them.

**Keywords:** innovation, IPO, firm performance.

**Category of the paper:** Research paper.

### 1. Introduction

Dynamically developing companies, especially those conducting innovative activities, may have problems with obtaining the necessary capital. Therefore, these entities decide to debut on the stock exchange. The literature indicates that after an IPO, innovation decreases, and the economic results of enterprises deteriorate. The aim of the article was to examine how a stock exchange debut affects the economic situation of innovative and non-innovative companies debuting on the Polish stock exchange. The presented problem is of great practical importance. The research results may prove useful for people managing enterprises and responsible for shaping the innovative activities of enterprises and the methods of financing them.

## 2. Innovation and IPO

The company's development increases its financial needs, and one of the possibilities of obtaining capital is offered by the public market through the issue of shares. A skillful issue and the possibility of offering your securities to an unlimited circle of potential buyers allows for a significant improvement in the company's market position.

The initial public offering of shares on the Polish stock exchange can be carried out in three ways: through public subscription of new issue shares, through public sale of existing shares, and through a combination of a public sale offer and public subscription. In the literature, the IPO is treated generally and interpreted in various ways, but most often it is presented in a narrow approach, i.e., the issue of new shares (Sosnowski, 2013). This approach to IPO was used in this work.

Going public of an innovative company is associated with several consequences that depend on many factors. However, the impact of IPO on the level of innovation is not clear. Innovative entities are usually difficult to value by potential shareholders, which makes them susceptible to mispricing during the IPO. Often, company managers may try to increase the IPO price by excessively investing in research and development, signaling to investors the prospect of growth. On the other hand, they may reduce R&D spending to increase reported results. Managers are more willing to reduce R&D expenses because the presented financial results are a stronger incentive for investors (Darroug, Rangan, 2005). Revaluation of a company during an IPO may affect innovation in two ways. The first view refers to the short-sightedness of managers caused by enormous market pressure resulting in involvement in short-term projects. The revaluation of the company creates the need to maintain it. To this end, managers can adopt ready-made innovations from the market to help justify and maintain high valuations. Due to risk and fear of negative impact on the action, managers are less willing to implement their own innovation projects. It should therefore be emphasized that the revaluation of company shares during the IPO inhibits the development of internal innovation. On the other hand, overvaluation of shares may prompt managers to satisfy investors' excessive optimism. Innovation may prove to be a confirmation of the high valuation (Shen et al., 2021).

Private ownership creates incentives for innovation, while public ownership discourages it. Private companies often take greater risks, invest in new products and technologies, and undertake more radical innovation activities. They implement complex and untested projects and are more likely to make organizational changes. Public companies, on the other hand, usually choose more conventional projects, which is why entities go public after introducing breakthrough innovations (Ferreira et al., 2014). On the other hand, public entities invest more, especially in research and development, than private entities. The stock exchange facilitates larger investments, especially in risky projects, by accessing capital and spreading risk among a larger number of shareholders. A major disadvantage of public ownership is the

pressure from shareholders and their short-sightedness, which results in giving up long-term investment opportunities (Feldman et al., 2018; Wang et al., 2022). Post-IPO, companies are expected to introduce innovations with greater diversity (different flavors, colors, package sizes, etc.). However, these are not breakthrough innovations. There is also a decline in the quality of innovation (Aggarwal, Hsu, 2014; Wies, Moorman, 2015; Jiang, 2019). The overall reduction in the level of innovation after the IPO may be due to the use of new capital to purchase technologies already existing on the market rather than investing in internal innovations (Tseng, Tseng, 2016).

The IPO contributes to a change in implemented projects consisting in reduced internal innovation, employee turnover and a decline in the productivity of other inventors, as well as an increase in the acquisition of external technologies (Bernstein, 2015; Dambra, Gustafson, 2021). Despite the general decline in innovation after the IPO, it is possible to maintain the level of innovation before the IPO. The source of success for such companies is developing appropriate innovative behavior much earlier than the stock exchange debut (Wies et al., 2023).

The decision to take a company public may have various impacts on its innovation activities. Most studies find a reduction in innovation after an IPO, largely due to the company's exposure to strong capital market pressures for short-term returns. On the other hand, investors expect long-term growth, and investments in research and development are a clear signal of growth for them.

### **3. Economic effect of the company after the IPO**

The impact of IPO on company results is not clear, but most economists indicate that almost all companies experience declines after going public. This is visible in operational results, sales levels, and overall productivity, and related to companies being less responsive to investment opportunities after they go public (Lerner, 2011). This is visible in operational results, sales levels, and overall productivity. This is related to companies being less responsive to investment opportunities after they go public (Wies, Moorman, 2015).

Research conducted on a sample of 682 companies debuting on the American market in the years 1978-1998 showed that operating profit in relation to total assets decreased both in the year of debut and three years after it. Similar results were obtained on a sample of Thai (1987-1993), Malaysian (1990-2000), European (1995-2006), and Turkish (2003-2011) companies. It can therefore be concluded that the IPO is statistically significant and has a negative impact on the company's results. Different research results were obtained when analyzing 79 companies debuting in 21 developing countries in the years 1987-1993. Both operating margin, ROA and ROE increased after the IPO (Mhagama, Topak, 2019).

A study conducted on a group of companies listed on the Thai stock exchange in 2009-2013 allowed the conclusion that after the IPO, both the ROA and ROE tend to decrease, but the ROA increases if the company is supported by Venture Capital funds. These results are seen up to five years after the IPO (Chalarat, 2018). An analysis of the post-IPO performance of Malaysian companies shows a decline in the year of IPO and three years thereafter. However, the company experiences the greatest declines in the year immediately after the IPO. N.A. Ahmad Zaluki (2005) justified this by aggressively shaping the financial result. J.L. Kao et al. (2009) found that companies with better pre-valuation accounting performance have greater post-IPO profitability declines, lower first-day stock returns, and worse long-term post-IPO stock performance. Profitability declines because companies are unable to maintain their current manipulation of earnings, which in turn results in poor stock performance after the IPO. N. Boubakri and J.C. Cosset (1998), obtained different results on a group of companies debuting on developing markets noticed the positive impact of the IPO on the company's results in later years. Similarly, B. Larrain et al. (2021) they noticed an increase in ROA after the debut. It is indicated that companies that are perceived by IPO market participants as more innovative achieve better results after the IPO compared to the year preceding the debut (Chemmanur et al., 2020).

Based on the above analysis, it can be concluded that the IPO negatively affects the company's results. Typically, performance is lower in the debut year and the short period after the IPO. It is worth noting, however, that innovations are a factor mitigating the above relationship. Sometimes they can completely change this direction.

Based on the literature review, a research hypothesis was formulated:

***H: The economic situation of an innovative company after its debut deteriorates to a lesser extent than that of a non-innovative company.***

#### **4. Database and methodology**

The study covered Polish companies debuting on the WSE in 2007-2018 to provide a seven-year time frame (3 years before, the year of IPO and 3 years after it). Financial institutions were excluded from the group of debutants due to the specificity of their activities and the specificity of the indicator assessment. For the purposes of this study, it was decided to separate entities from the group that offered sale only of new shares. Moreover, the company's transfer from the alternative market to the main market was not considered a debut. Ultimately, less than 29% of companies debuting on the WSE (98 entities) in 2007-2018 were analyzed, of which 22 companies were innovative.

For the purposes of the research, all enterprises that were granted at least one patent or applied for one in the years preceding their debut were considered innovative enterprises. The research and its analyses were carried out based on available economic and financial data contained in financial statements, issue prospectuses, stock exchange information of companies debuting on the WSE and in patent statistics.

Because the companies debuted throughout the year, data from the year of the IPO were excluded from the analysis to ensure data comparability and equality of ranks necessary to conduct the Wilcoxon test. "Pre-IPO" indicators were calculated for data from three years before the IPO, while "post-IPO" indicators were calculated for data from three years after the debut. To draw basic conclusions, descriptive statistics were used, i.e., arithmetic mean, median, minimum value, maximum value, and standard deviation. Differences were compared using the Shapiro-Wilk normality test. Based on its result, a test was selected between the Student's t-test and the Wilcoxon test.

## 5. Results

The results obtained are presented in tables divided into innovative and non-innovative companies. Three categories of indicators were included: general information, profitability, and financial liquidity of companies.

### 5.1. General information – innovative companies

In order to verify the hypothesis, first the number of patents, total employment (FTE), total assets and the size of the company (logarithm total assets) were compared.

**Table 1.**

*General information on innovative companies debuting on the WSE before and after the IPO*

Index	X	Arithmetic average	Median	Min	Max	SD
Numbers of patents (pcs)	before IPO	0,61	0	0	6,00	1,11
	after IPO	0,39	0	0	5,00	0,93
Total employment (FTE)	before IPO	2 794,00	176,00	27,00	47 734,00	10 106,10
	after IPO	2 873,34	272,00	38,00	45 383,00	9 427,86
Total assets (PLN)	before IPO	2 476 478,04	82 591,39	31,00	54 987 902,00	10 396 328,45
	after IPO	3 067 603,72	249 966,50	18 865,00	58 762 631,00	11 781 941,44
Size (ln total assets)	before IPO	11,47	11,32	3,43	17,82	2,17
	after IPO	12,55	12,43	9,85	17,89	1,72

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

**Table 2.**

*Comparison of general data on innovative companies debuting on the WSE before and after the IPO*

Index	Shapiro-Wilk test			Difference test		
	Statistics	df	Test significance	Test selection	Result of the test	Test significance
Numbers of patents	0,547	132	0,000	Wilcoxon	-1,260	0,208
Total employment	0,293	125	0,000	Wilcoxon	-4,595	<b>0,000</b>
Total assets	0,250	131	0,000	Wilcoxon	-6,362	<b>0,000</b>
Size (ln total assets)	0,916	131	0,000	Wilcoxon	-6,839	<b>0,000</b>

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

The above results indicate that among innovative companies debuting on the WSE after the IPO, innovation measured by the number of patents decreases. The size of the company is increasing, measured both by total employment (by 80 positions on average) and in total assets (Table 1).

Conducting a test of the significance of differences allowed us to notice that among innovative companies there are statistically significant differences in the results achieved before and after the IPO in the categories of total employment, total assets, and total assets (Table 2).

## 5.2. General information – non-innovative companies

The same indicators regarding general characteristics were compared among non-innovative companies debuting on the WSE.

**Table 3.**

*General information on non-innovative companies debuting on the WSE before and after the IPO*

Index	X	Arithmetic average	Median	Min	Max	SD
Numbers of patents (pcs)	before IPO	0	0	0	0	0
	after IPO	0,09	0	0	8,00	0,58
Total employment (FTE)	before IPO	386,52	102,00	1,00	11 174,00	1 373,61
	after IPO	415,50	179,00	3,00	10 358,00	1 232,84
Total assets (PLN)	before IPO	242 145,22	64 043,00	1 396,00	9 816 186,00	891 683,16
	after IPO	478 805,27	140 780,00	4 606,00	14 162 151,00	1 521 745,86
Size (ln total assets)	before IPO	11,01	11,07	7,24	16,10	1,54
	after IPO	11,94	11,85	8,44	16,47	1,38

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

**Table 4.**

*Comparison of general data on non-innovative companies debuting on the WSE before and after the IPO*

Index	Shapiro-Wilk test			Difference test		
	Statistics	df	Test significance	Test selection	Result of the test	Test significance
Numbers of patents	0,079	462	0,000	Wilcoxon	-3,274	<b>0,001</b>
Total employment	0,237	401	0,000	Wilcoxon	-6,907	<b>0,000</b>
Total assets	0,234	451	0,000	Wilcoxon	-11,828	<b>0,000</b>
Size (ln total assets)	0,994	451	0,055	t-Student	-16,908	<b>0,000</b>

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

The obtained results show that making non-innovative companies public on the WSE leads to a slight increase in their innovativeness measured by the number of patents. Total employment increases (by approximately 30 positions on average), average total assets almost double, and therefore total assets increase (Table 3).

Similarly, to the results of innovative companies, also for non-innovative ones, the differences in results between the situation before and after the IPO are statistically significant in the case of indicators regarding the size of the enterprise, and additionally also in the case of the number of patents (Table 4). Raising capital on the stock exchange opens up new development prospects for companies. It is indicated that public enterprises often invest in assets, mainly intangible ones, which would confirm the increase in their size obtained in the research. the status of public companies helps attract new employees. Increasing production capabilities and growing sales force an increase in the company's labor resources (Chemmanur et al, 2020). At the same time, there is often an exodus of key innovators after an IPO, which is why companies need to develop incentives and provide a favorable working environment (Bernstein, 2015). This research is limited to examining the amount of total employment, ignoring the education of employees, which is often significant for the implementation of innovative processes.

### 5.3. Profitability - innovative companies

In the next stage, the profitability achieved before and after the IPO by companies conducting innovative activities was compared. For this purpose, changes in ROA, ROE and ROS indicators were examined.

With respect to innovative companies, the IPO had a negative impact on ROA and ROE indicators. There was a noticeable positive impact on the ROS index, improvement from -13.73 to -0.21. However, sales among innovative companies remained unprofitable (Table 5).

**Table 5.***Profitability of innovative companies debuting on the WSE before and after the IPO*

Index	X	Arithmetic average	Median	Min	Max	SD
Net ROA	before IPO	0,07	0,08	-1,90	0,50	0,27
	after IPO	0,01	0,05	-1,33	0,43	0,21
Net ROE	before IPO	0,15	0,14	-3,28	0,75	0,47
	after IPO	0,07	0,08	-1,24	1,72	0,29
Net ROS	before IPO	-13,73	0,07	-400,06	0,53	68,84
	after IPO	-0,21	0,06	- 11,68	0,54	1,56

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

**Table 6.***Comparison of the profitability of innovative companies debuting on the WSE before and after the IPO*

Index	Shapiro-Wilk test			Difference test		
	Statistics	df	Test significance	Test selection	Result of the test	Test significance
Net ROA	0,464	131	0,000	Wilcoxon	-3,865	<b>0,000</b>
Net ROE	0,517	131	0,000	Wilcoxon	-4,336	<b>0,000</b>
Net ROS	0,127	129	0,000	Wilcoxon	-2,068	<b>0,039</b>

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

Among innovative companies, there are statistically significant differences in the results achieved before and after the IPO in relation to all profitable indicators (Table 6).

#### 5.4. Profitability – non-innovative companies

Then, changes in profitability among non-innovative companies were examined.

**Table 7.***Profitability of non-innovative companies debuting on the WSE before and after the IPO*

Index	X	Arithmetic average	Median	Min	Max	SD
Net ROA	before IPO	0,09	0,07	-0,14	0,63	0,11
	after IPO	-0,03	0,03	-1,67	0,25	0,24
Net ROE	before IPO	0,24	0,18	-4,76	3,20	0,48
	after IPO	-0,08	0,06	-7,76	3,17	0,95
Net ROS	before IPO	-0,23	0,04	-58,01	2,43	4,00
	after IPO	-0,29	0,03	- 24,58	0,90	1,89

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

**Table 8.***Comparison of the profitability of non-innovative companies debuting on the WSE before and after the IPO*

Index	Shapiro-Wilk test			Difference test		
	Statistics	df	Test significance	Test selection	Result of the test	Test significance
Net ROA	0,649	451	0,000	Wilcoxon	-7,848	<b>0,000</b>
Net ROE	0,454	451	0,000	Wilcoxon	-8,334	<b>0,000</b>
Net ROS	0,108	449	0,000	Wilcoxon	-5,018	<b>0,000</b>

Source: own study based on data obtained from financial documents of companies debuting on the WSE.



Companies not conducting innovative activities recorded a deterioration in all profitability indicators, the largest drop was noticeable in the case of ROE. It is worth emphasizing that the post-IPO metrics were negative, which confirms the unfavorable situation of companies after their stock exchange debut. Additionally, after the debut, the average profit per share decreased and non-innovative entities showed a loss (Table 7).

The above table (Table 8) indicates the existence of statistically significant differences between the profitability of non-innovative companies before and after the IPO.

The obtained results confirm that the profitability of companies after IPO decreases, but the decreases are smaller for companies conducting innovative activities. A decrease in profitability ratios (ROA and ROE) among companies listed on the Thai stock exchange in 2009-2013 was also noticed by A. Chalarat (2018). Other researchers also pointed to the deterioration of profitability indicators, emphasizing the role of shaping the financial result before the IPO (Ahmad Zaluki, 2005). However, this issue was omitted in this study. However, it can be assumed that entities debuting on the WSE influence the financial result to some extent, as the decline in profitability is often explained by problems with maintaining the current results (Kao et al., 2009).

### 5.5. Financial liquidity - innovative companies

The next step focused on changes in financial liquidity and debt of innovative companies.

In the case of financial liquidity ratios, their average values increased after the IPO, exceeding the standards accepted in the literature, which proves the financial surplus of companies after the debut. At the same time, the total debt ratio (from 0.47 to 0.36) and the equity debt ratio (from 1.33 to 0.61) decreased, which may indicate the implementation of an appropriate innovation strategy using the optimal capital structure (Table 9).

**Table 9.**

*Financial liquidity and debt of innovative companies debuting on the WSE before and after the IPO*

Index	X	Arithmetic average	Median	Min	Max	SD
Current ratio	before IPO	1,79	1,51	0,32	7,27	1,21
	after IPO	3,25	1,75	0,16	20,23	3,64
Quick ratio	before IPO	1,35	1,11	0,16	7,27	1,12
	after IPO	2,61	1,36	0,14	20,23	3,62
Cash ratio	before IPO	0,49	0,15	0,00	6,12	0,96
	after IPO	1,38	0,30	0,01	18,22	3,34
Total debt ratio	before IPO	0,47	0,41	0,07	0,87	0,20
	after IPO	0,36	0,30	0,06	1,77	0,25
Debt equity ratio	before IPO	1,33	0,75	0,07	6,50	1,33
	after IPO	0,61	0,44	-2,29	3,16	0,72

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

**Table 10.**

*Comparison of financial liquidity and debt of innovative companies debuting on the WSE before and after the IPO*

Index	Shapiro-Wilk test			Difference test		
	Statistics	df	Test significance	Test selection	Result of the test	Test significance
Current ratio	0,559	131	0,000	Wilcoxon	-4,454	<b>0,000</b>
Quick ratio	0,484	131	0,000	Wilcoxon	-4,173	<b>0,000</b>
Cash ratio	0,366	129	0,000	Wilcoxon	-3,355	<b>0,001</b>
Total debt ratio	0,888	126	0,000	Wilcoxon	-4,939	<b>0,000</b>
Debt equity ratio	0,740	126	0,000	Wilcoxon	-5,157	<b>0,000</b>

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

The results of the Wilcoxon test comparing differences in financial liquidity and debt of innovative companies debuting on the WSE confirm that these differences are statistically significant (Table 10).

## 5.6. Financial liquidity – non-innovative companies

Financial liquidity and debt ratios behave similarly to indicators for innovative entities but are similar to the standards adopted in the literature. The only indicator with a different tendency of change is the debt-to-equity ratio. In the case of non-innovative companies, it increases after the IPO (from -3.82 to 1.27), which indicates a very high burden of external capital on equity capital (Table 11).

**Table 11.**

*Financial liquidity and debt of non-innovative companies debuting on the WSE before and after the IPO*

Index	X	Arithmetic average	Median	Min	Max	SD
Current ratio	before IPO	2,06	1,32	0,03	33,09	2,91
	after IPO	2,30	1,54	0,05	17,82	2,45
Quick ratio	before IPO	1,36	0,86	0,03	33,09	2,65
	after IPO	1,58	0,95	0,03	15,86	2,10
Cash ratio	before IPO	0,46	0,10	0,00	31,97	2,25
	after IPO	0,55	0,16	0,00	13,19	1,22
Total debt ratio	before IPO	0,57	0,62	0,06	1,09	0,21
	after IPO	0,53	0,50	0,06	6,49	0,51
Debt equity ratio	before IPO	-3,82	1,71	-1 186,56	35,14	79,88
	after IPO	1,27	0,95	-6,89	22,21	2,49

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

**Table 12.**

*Comparison of financial liquidity and debt of non-innovative companies debuting on the WSE before and after the IPO*

Index	Shapiro-Wilk test			Difference test		
	Statistics	df	Test significance	Test selection	Result of the test	Test significance
Current ratio	0,533	451	0,000	Wilcoxon	-2,858	<b>0,004</b>
Quick ratio	0,433	451	0,000	Wilcoxon	-3,462	<b>0,001</b>
Cash ratio	0,224	444	0,000	Wilcoxon	-3,301	<b>0,001</b>
Total debt ratio	0,537	451	0,000	Wilcoxon	-5,352	<b>0,000</b>
Debt equity ratio	0,039	451	0,000	Wilcoxon	-7,058	<b>0,000</b>

Source: own study based on data obtained from financial documents of companies debuting on the WSE.

The results of the Wilcoxon test comparing differences in financial liquidity and debt of non-innovative companies debuting on the WSE confirm that these differences are statistically significant (Table 12).

Obtaining the status of a public company increases the possibilities of obtaining external financing. Public companies often receive bank loans on preferential terms. Moreover, it is confirmed that innovative companies may encounter problems in obtaining external funds necessary to finance innovative projects, which is also reflected in the total debt ratio. An interesting phenomenon is the financial excess shown by innovative companies. These entities deliberately maintain a high level of cash, and the financial surplus is the result of the implemented innovation strategy (Gryko, 2008). Companies conducting innovative activities must therefore maintain high cash levels to be able to finance the next stage of the innovation process at any time.

The above analysis concerned the verification of the hypothesis assuming that the economic situation of an innovative company after its debut deteriorates to a lesser extent than that of a non-innovative company. The hypothesis was confirmed using descriptive statistics and significance tests. Profitability indicators achieved by companies debuting on the WSE decrease after the IPO, but in the case of innovative companies, these decreases are smaller. Additionally, it was confirmed that innovative companies burden the company's assets much more with external capital.

## 6. Summary

An IPO is one of the ways to raise capital for developing enterprises, especially those that conduct innovative activities. An IPO carries both many benefits and risks. First of all, it is an opportunity to obtain large capital, improves credibility and creates the opportunity to improve the company's economic situation. From the point of view of innovative activity, it allows risk to be spread over a larger number of shareholders and to attract new innovators to the company. On the other hand, carrying out the process is very expensive and time-

consuming, and also results in capital dilution. Moreover, innovative entities may face pressure from shareholders who will demand that they give up long-term innovative projects in favor of short-term profits. Moreover, economists have noticed that going public is associated with a deterioration of its economic situation after the debut. The results of our own research allowed us to notice that the IPO affects the deterioration of the economic situation of companies debuting on the WSE. The hypothesis was confirmed using descriptive statistics and significance tests. This is visible primarily in the deteriorating profitability indicators. However, conducting innovative activities before the debut protects the company against deterioration of indicators. Therefore, the company's managers should analyze the benefits and negative aspects resulting from the IPO in order to make the optimal decision for the company's economic situation and innovative activities.

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