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Price Movements of IPO Stocks during the Lock-Up Period

Summary: The main question of the study is whether there is a relationship between the success of stock market launches, i.e. initial public offerings (IPOs), in innovative industries and the stock price movements in the first six months after the IPO. The starting point is the examination of the efficient market theory and the analysis of the types of secondary market price stabilisation processes. Seventy IPOs with shares that had been launched and traded on NASDAQ for at least six months before August 2017 constitute the data examined. The period examined is only six months, as this was the so-called lock-up period. The study focused on the fact that not every IPO in the sample was successful, as indicated by returns and stock prices. The first hypothesis of the author is that the IPO price has a substantial influence on later returns. The second hypothesis stipulates that sector characteristics have an effect on the success of the IPO, and that there are significant differences between the sectors examined regarding return and stock price indicators. Descriptive statistics have clearly shown that for a significant part of the companies the stock market launch was not successful, as shares generated a negative return for investors and owners, and according to the stock prices, the assets of owners decreased by 60 percent from their initial investment. At the first hypothesis, a partial correlation was established, but the IPO price has no effect on later returns mostly. It has been confirmed, however, that performances move in the same direction, which means return levels are correlated, and if a company's performance is good in the first thirty days, it is likely to be successful in the future as well in terms of returns. The second hypothesis has been partly confirmed, differences among sectors, stock prices and returns have only been found in a few cases. It is important to note, however, that the first six months on the stock exchange do not provide adequate predictions about the future of the company, as we have seen with the shares of Facebook.

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A classic solution for business associations to raise capital is the initial public offering (IPO). Going public is an important test of business maturity. After raising small amounts of private capital from a very limited number of investors, when a company goes public its shares become available for every stakeholder on the market. This transaction on the capital market, however, is just the beginning of a long process: After going public and entering the world of professional investors, the management of the company is under a new and incessant pressure to perform. This is also an in-

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dicator of business maturity (Lentner, 2002). Before the stock market launch, the company steps into the limelight, presenting its business plan at an international roadshow. Large, portfolio-based asset management companies, with assistance from the investment bank handling the IPO as an advisor, learn about the company and decide whether to take part in the transaction or not. Highly successful and failed IPOs get substantial media coverage, and considerable profits can be achieved in a relatively short period of time with these investments.

The decisive factor, however, is the appropriate and attractive price.

In an analysis of pricing practices, the periods before and after the dot-com crash must be viewed separately. Before 2000, in many cases there was intentional underpricing, the IPO price was set low so that the investment services provider handling the subscription would give its key clients an advantage with the underpriced shares allocated during the IPO. Clients in this favourable position could make considerable capital gains in the initial days of the IPO with this practice, which is called *spinning* (Lavigne et al., 2011; Mantell, 2016). A Voluntary Initiative was introduced by the self-regulatory body FINRA in 2003 to curb this phenomenon, and FINRA rule 5131 introduced restrictions regarding the allocation of shares to the executive officers of the issuer during the IPO, and an obligation of the lead underwriter to continuously provide information to the issuer about investor interest during the pricing period. As a result, underpricing has significantly decreased in the US at IPOs. Overpricing is less prevalent and the reputational risk for the investment service provider handling the subscription is dissuasive enough. This pricing problem can be described with the concept of information asymmetry: The lead underwriter has significantly more information than the issuer and retail investors and can use this to their benefit. With the issuer, it is underpricing, with retail investors, it is overpricing. Retail investors have the least amount of information about the issuing company, in their case there is also the risk of adverse selection decreasing the chance of receiving a return on their investment (Mantell, 2016).

For existing private investors to achieve returns proportionate to the risks they took and to make selling their shares worthwhile, and for the years of work by the founders/owners to be acknowledged by the market, a price must be set that is attractive enough for them to sell their shares. The standard deviation of initial IPO returns shows if price-setting was adequate. This suggests that there is a significant difference between the standard deviation of the two selling techniques, subscription at the set price based on the price range and auctions, in favour of the latter. (Lowry et al., 2006) This way an appropriate supply of shares can be ensured. For new investors, however, the possibility of further significant returns is also important, as this is the basis of adequate demand. This means the IPO price must be low enough for new investors. This is a price that allows new investors to realise further capital gains. Finally, a price range must be set, taking the interests of the supply and the demand side into consideration, so that the participants of the IPO can decide how many shares and at what price they want to sell or buy. Empirical research has shown that the success of the IPO pricing depends largely on the time of the IPO. The standard deviation of initial IPO returns is lower during an upward trend than during a sideways drift or a downward trend (Lowry et al., 2006).

As the subscription of shares is a binding offer, this decision requires careful consideration, and for that the data in the prospectus (which is sometimes several hundred pages long) can provide some guidelines. Why just

guidelines? Because in this period, the business model is typically being tested, and the long-term viability of the model on the market, i.e. the profit-generating ability of the company, is only visible in the long term (Bács, Lukács, Turóczi, Zéman, 2016). Companies often enter the capital market at such an early stage of their life cycle and the market is so competitive, that it takes years to gain actual profits, and sometimes developments sweep away the business model and profit expectations are not or not fully met. Empirical research has shown that the success of the IPO pricing depends largely on the type of the issuing company as well. If the issuer is a firm that is difficult to value (recently established, small tech firms), the standard deviation of the IPO returns is much higher than at issuers with a longer history that are active in traditional industries (Lowry et al., 2006).

In the latter case, capital gains also fall short of expectations, and as disappointed investors sell their shares, it leads to a further decrease in the stock price. Besides, new, disruptive technologies may appear that are significantly different from the previous business model, so much so that they disrupt this model completely (Bujtár, 2018). Whether such disruptive technologies are commercially viable is only determined in the medium or long term. Whichever scenario it is, failure or success, to clearly and finally determine whether the new technology is viable on the market, sometimes it needs to be present on the market and, in our case, on the stock exchange for years.

The aim of the study is to examine the IPOs of NASDAQ[1] from the previous year – as this is the stock exchange that lists and predominantly represents innovative industries – to answer the question whether the stock price movements in the first six months predict the success of stock market launches.

Before giving a detailed description of the present research, it should be noted that based on his previous research, the author has already analysed distortive effects that have a significant impact on trading in the first six months after the stock market launch (Kecskés, Halász, 2011). The first period after the IPO attracts special attention from investors and major media coverage. A successful market launch can significantly increase the demand for the securities of a company, and it has a major impact on its long term reputation. At the same time underwriters want to make quick profits after the initial issue and want to quickly realise the capital gains that have accumulated on paper since the stock market launch. This is why it is important for investment service providers handling the IPO – in the US investment banks – to maintain the stock price. With the exit of previous investors on the supply side, stock prices can start going down. The *lock-up period* was created to restrict this phenomenon (it is typically 180 days on the stock markets in the US), which postpones this price depressing effect from the supply side. Lock-up periods in the US are typically shorter. In the EU, however, lock-up periods are typically longer, in the UK it is 600 days. Empirical research has not found significant changes between stock price movements during and after the lock-up period, with the exception of the US, on the day of the expiry. The fact that there is no such change confirms that the lock-up period is necessary and that it fulfils its purpose, i.e. it decreases the fall in the stock price (Goergen et al., 2004).

MODELS OF THE BEHAVIOUR OF CAPITAL MARKET STAKEHOLDERS

Several models have been created in economics for the operation of market participants, but no model has perfectly described the operation of the market. The main reason for this is

the complexity of such large-scale and permanently numerous transactions of human behaviour.

The models of adaptive and rational expectations

To be able to understand the specific events of the capital market, it is important to understand what drives market operators. Market operators rely on their expectations when they make decisions. These expectations may be formed based on past data, current market information or an estimate about the future. Until the 1950s and 1960s, economists assumed that future economic events are defined by past experience. According to this model, they assumed that if inflation was three percent in the past ten years, it will be around three percent in average in the coming years, too. When you expect that future changes will happen slowly, according to the changes in past data, it is called adaptive expectations (Bélyácz, 2013).

However, because of the increasing amounts of information and some changes that had shock effects, it has become clear that the model of adaptive expectations cannot adequately describe future expected values. Just think about how the oil crises in the 1970s changed the global economy and how the scandals of some corporations can change the operating environment of a whole industry. As a result of such events, decision-makers quickly change their previous expectations. *John Muth,* an American professor of economics[2], developed a more efficient model that describes the changes in market expectations better. This is the model of rational expectations (Muth, 1961). The essence of Muth's model is that expectations are the same as the optimal forecast (the best guess of the future) if all available information is used.

The efficient market theory

By applying rational expectations to financial markets, the model of rational expectations led to the efficient market theory, a new theory that was dominant on the financial and capital market for a long time. With this correspondence, price movements on the market can also be described nicely. According to the efficient market theory, current prices in a financial market will be set so that the optimal forecast of a security's return using all available information equals the security's equilibrium return (Mishkin, 2013).

We can draw two important conclusions from this hypothesis.

❶ If the value of the variables of the model that determine the equilibrium return changes, the price changes. The model includes, for example, the risk-free return, which the market equates to the return of the three-month discount treasury bills. This return changes as a result of the monetary policy of the central bank, so this is what influences the price of a stock or a bond as well. This is the macroeconomic level, which affects the price of everything that is traded in the given country. Positive and negative changes in the life of the issuer of the given financial instrument as a company, like the market authorisation of a new active substance for medicinal products or a scandal related to the accounting of the company, change the variables on which the price is based on the level of the company, i.e. on a microeconomic level. As a result, this change affects expected future returns, based on which the current prices can be determined according to the efficient market theory.

❷ The other important conclusion is that in average, prediction errors converge to zero and thus cannot be predicted. This means that market operators keep changing their rational expectations by integrating new information. The basis of the practical implementation of this

conclusion is the activity of arbitrageurs. An *arbitrageur* is a market operator who makes use of the fact that the equilibrium price is not yet reflected in the market price, by entering the market as a buyer to make profit from the increasing price, or as a seller, to make profit from the expected fall in the price (*selling short*) and to buy back the same instrument later for a lower price. In this case it may seem that the efficient market theory doesn't work, as the market couldn't ensure the equilibrium price immediately. This, however, does not contradict the model, as, according to the second conclusion, prediction errors do occur, just the deviation of the error from the average cannot be determined for the future. However, it is also true that not all information is available to every market operator and even if it is, it is not certain that every market operator processes that information according to rational expectations or does so for every single market instrument. Even those who control *smart money*[3], i.e. investors who exploit opportunities to make quick profits, can't monitor every single financial instrument on each and every market, or there is so little difference from the optimal price that it is not worth making the transaction because of the transaction costs, the low level of liquidity and high *spread*[4] (the difference between the bid price and the ask price). However, it should be noted that in the case of an IPO transaction, it is not possible to make profit with this method, as there is no possibility of arbitrage between the time of issue and the time trading begins on the stock exchange, as the securities from the issue cannot be publicly traded during this period.

Efficient market theory: Models of different strength

As opposed to this, in practice the name of the efficient market theory is not perfect to begin with, as it does not refer to whole markets but to specific financial instruments. The strong model of efficient markets stipulates that a certain kind of investment is as good a saving form as any other, as the price of a financial instrument is a perfect reflection of its *intrinsic* value. The other assumption is that all the information that affects the intrinsic value of a financial instrument is always incorporated in the price of the instrument. Finally, the most important assumption according to the strong model is that the leaders of financial and non-financial companies can accurately determine the cost of capital and based on that they can decide accurately whether it is worth taking the given investment decision or not (Borzán et al., 2011). According to the third assumption, yields on the treasury bond market can be perfectly predicted at all times. However, with this we would also assume that every operator on the market focuses their investments on the treasury bond market, since, as a result of predictable prices, here it is possible to make profits with low or zero risk. This, however, is not at all true. This way the yield curve would become predictable, too, which would make the predictability of recessions risk-free. With this, stock market crashes could also be prevented. These theoretical conditions, however, because of the complexity of the system of its many variables, are not met in practice.

Thus, it can be established that it is probably the semi-strong version of efficient markets that is true for financial instruments and financial markets, which assumes that prices reflect the fundamental value of financial instruments. Unfortunately, this is not true for financial and capital markets, either, because of the capital market bubbles[5] that develop. Eventually it was only the weak form of the efficient market theory that proved to be true. According to this model, the prices of financial instruments only include past information. As a result, there are no long-term trends

on the markets that, when followed, could lead to returns persistently above the market average (market index). This means that past prices do not predict future price movements, either, so exploiting short-term profit opportunities is important for market operators. It is discernible in the increased volatility of prices, i.e. in the long-term increase of the amplitude of price swings. This is why financial instruments on financial markets can deviate from the fundamental value for longer time intervals, and because of this market bubbles and market crashes can't be predicted, either. Based on these facts, only the weak model is confirmed in the efficient market theory.

LOCK-UP PERIOD

During the IPO, there is usually a *lock-up* period set for the existing shareholders of the company (Hurt, 2006). In this period, they are not allowed to sell their shares, and they commit to this in their agreement with the lead manager (Rueda, 2001). Investors find it attractive when there is no option of an immediate exit for existing shareholders at an IPO. As a result, *lock-up* agreements are common practice (Geddes, 2008). One advantage is that certain shareholders (e.g. venture capital funds) are not allowed to sell their shares immediately after the initial public offering (Kecskés, Halász, 2011). It is an important sign that those with reliable information on the company do not wish to leave the firm because of some negative prospects. The *lock-up period* also helps stabilise the price, as it temporarily caps the supply of shares and decreases the supply pressure on the price (Draho, 2005). If existing shareholders wanted to sell their shares (or a part of them) immediately, it would clearly be a difficult task for the lead manager to keep the secondary market price above the offering price in the first trading days with price stabilising tools (Geddes, 2008). Because of this, the approval of the lead manager is required for shortening the period or getting an exemption from the ban on sales (Hurt, 2006). However, according to an empirical study, if the *lock-up period* is shortened after the transaction, it results in a 23 percent fall in the stock price within ten days of the announcement (Kecskés, Halász, 2011).

In the 1990s in the US, the average *lock-up* period was 180 days, and the restraint on alienation extended to approximately 95 percent of previously issued shares (Geddes, 2008). In the sample of 70 examined in the present study, the *lock-up* period was 180 days in every case. However, 90, 270 and 365-day lock-up periods are also frequently set (Geddes, 2008). The length of the lock-up period is determined by the capital market practices of national economies, and the relevant capital market regulations (Goergen et al., 2004).

Basically, a 180-day *lock-up* period is sufficient, as during this period, two sets of quarterly data are published, which confirms how the business plan presented in the prospectus is being implemented. Different *lock-up* periods can be set for the management of the company and other shareholders (Geddes, 2008). However, even with *lock-up* agreements, shareholders can apply various techniques to transfer the risks. Shares may be used, for example, as collateral in loan transactions, and risks are also transferred when the shares are used in derivative (off-exchange, *forward*) transactions (Kecskés, Halász, 2011).

SOURCE AND ANALYSIS OF THE DATA USED

The data used is from data provided by NASDAQ[6]. A database of seventy IPOs with shares that had been launched and traded on NASDAQ for at least six months before August

2017. The issues were categorised by industries by the author. It is important to note that as the second largest stock exchange in the US, NASDAQ still attracts firms with new technologies primarily, while its competitor, the New York Stock Exchange (NYSE), mostly lists companies from traditional industries. It should be noted that while, due to several factors, underpricing in IPOs is typical in developing countries (Basti et. al, 2015), it is not a problem for major operators on developed markets, including NASDAQ, but it doesn't mean that there can't be some exceptions, like it happened with the LinkedIn IPO (Dembosky, 2011).

Even though there are companies from traditional industries listed on NASDAQ, the business models of these companies (from the vehicle industry or mining, for example) are also mostly based on the new technologies in the respective industry. It should be noted that the Jumpstart Our Business Startup Act (Jobs Act) of 2012 achieved its goal, as it had a significant influence on the stock market launch of companies with advanced technologies: After the act came into effect, the number of IPOs of IT companies increased by 25 percent over the previous year (Dambra et al., 2015).

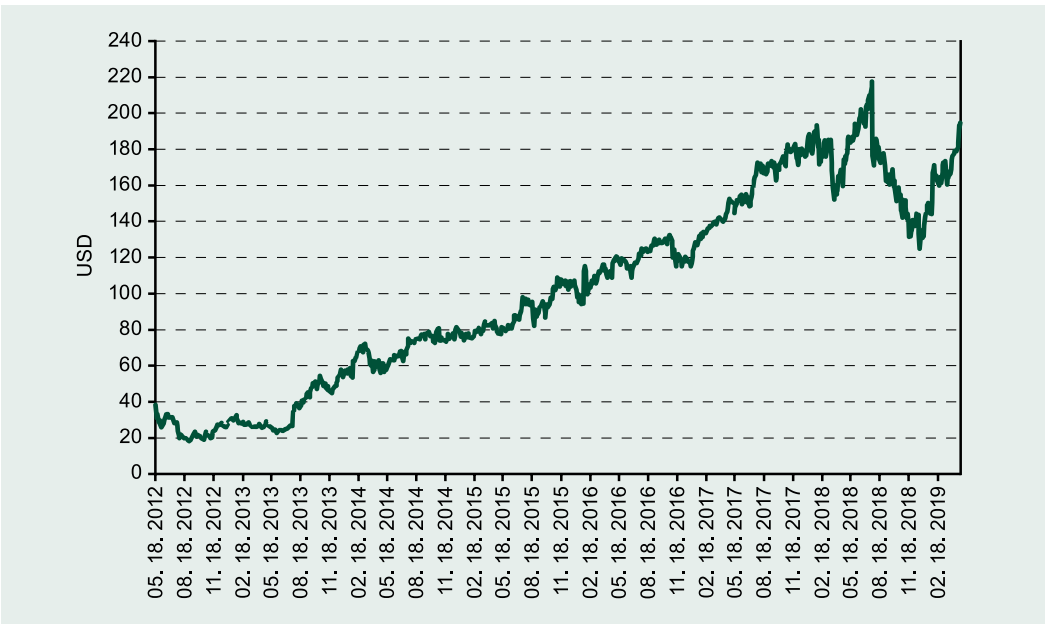
As the available datasets for the sample of 70 IPOs over the course of almost a year reveal, there is no significant correlation between the long-term success of IPOs and the price movements in the first six months. Regarding the various industries, the general decline in the raw material and energy sectors in the past year clearly had an impact on the price movements of the analysed issues after the stock market launch. The performance of the IT sector, which is dominated by the FAANG stocks[7], had the opposite effect. FAANG stocks soared in the period examined, which clearly had a positive effect on the price movements of the new firms in this industry after their IPO. In the financial sector it was obvious that the success or failure of the first period after the IPO almost exclusively depended on the issuer and its business model. In the case of financial companies, a former study revealed a relationship between the initial success of the IPO, debt levels, and venture capital backing in the early financing stages of the company (Barry, 2015).

However, regarding expectations, it is important to emphasise one phenomenon here. From the stocks mentioned earlier, it is the most visible in the case of Facebook that the first six months on the stock exchange do not predict the future of the company adequately (*see Figure 1*). In this short period and based on the years before the stock market launch, the market typically sees a business model built on one product or one service. It has also been established that even the innovation strategy of the company can change as it goes public (Bernstein, 2015). This is because market penetration takes more time with products that ensure a larger market share in the long term. As a result, it takes years even for products that develop extremely fast and gain market shares quickly to become market leaders.

The launch of Facebook competitor Snapchat on the stock exchange in March 2017 suggests a similarly rocky road. While the offering price of USD 19 saw a nearly 44 percent growth on the first trading day, and the price on the stock exchange went up to USD 24, five months later, the shares of the company traded at USD 17. The success of the company on the first day was not due to a well-founded business model but due to an attractive price and the euphoria that is so typical at IPOs. This phenomenon was summarised nicely by an analyst regarding the Snapchat IPO, stating that on the first day of an IPO investors feel that if they miss the 'success' of an IPO, they miss a new and great opportunity (Fear of Missing Out—FOMO) (Lien et al., 2017). However, in this case they don't take due ac-

Figure 1

DAILY CLOSING PRICE OF FACEBOOK SHARES FROM THE ISSUE UNTIL 30 APRIL 2019



Source: edited by the author based on data by NASDAQ

count of the long term risks of the company and the resulting challenges, as it is clear from *Figure 2*.

Analysis of the database based on statistical methodology

Hypotheses

The industry characteristics of IPOs in late 2016, by January 2017, reflect the megatrends, as in recent years companies in biotechnology, financial services, IT and energy play a major role in the global economy. A large part of the sample, 62.9 percent, are companies from these industries (*see Table 1 and Table 4*).

Following the theoretical introduction, the author formulated two hypotheses and one research question.

Research question: Not every IPO in the sample was successful, as indicated by returns and stock prices.

H1: The IPO price has a substantial influence on later returns.

H2: Sector characteristics have an effect on the success of the IPO, and there are significant differences between the sectors regarding return and stock price indicators.

The research question was examined with descriptive statistical tests, using percentiles. Correlation calculation was performed to substantiate the first hypothesis, and variance analysis to substantiate the second.

Statistical analysis was carried out with the SPSS 22 software package and the Microsoft Office suite.

Results

As presented in *Table 2*, in the case of returns on the first day, in the first 30 days, in the first

Figure 2

DAILY CLOSING PRICE OF SNAPCHAT (SNAP INC.) SHARES FROM THE ISSUE UNTIL 30 APRIL 2019

Source: edited by the author based on data by NASDAQ

60 days, in the first six months, and returns since the IPO, the stock market launch was successful in 70 percent of the sample, as it can be seen from the first day returns, and returns in the first 30 days and in the first six months. This can also be detected in the table where negative returns turn into positive. There is a 75 percent success rate in the case of the return in the first 60 days, which means 75 percent of the companies produced positive returns.

It is interesting to examine the minimum value, which is increasing even over this short period for the return indicators examined. The price of the best-performing stock is extremely high, it is 178 percent since the IPO.

If someone invested in this imaginary portfolio, buying the shares in the sample, they realised a mean return of 5.64 percent since the IPO. It is clear, however, that returns since the IPO are lower than returns in the first six months, only half of the sample produced a positive value. In the nearly two years since the expiry of the lock-up period, the mean return declined from 13.36 percent in the first 6 months to almost half this value (as of 4 January 2019). This is not a theoretical opportunity, through exchange traded funds (ETFs), this return is available to the average investor as well.[8] This means that the market launch of half the companies examined was not successful as they could not generate a return for their investors in the long term.

This shows that the market launch of a company greatly depends on its performance and there is no single recipe for success. Several stocks produced a negative return on the first day, which raises doubts about how well-founded the stock market launch was.

Correlation analysis was performed to substantiate the second hypothesis, where the key

Table 1

THE SAMPLE, BY INDUSTRY

Code		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Automotive industry	1	1.4	1.4	1.4
	Mining	1	1.4	1.4	2.9
	Biotechnology	13	18.6	18.6	21.4
	Health care	3	4.3	4.3	25.7
	Energy	9	12.9	12.9	38.6
	Construction	3	4.3	4.3	42.9
	Pharmaceutical industry	2	2.9	2.9	45.7
	Waste management	1	1.4	1.4	47.1
	IT	10	14.3	14.3	61.4
	Real estate	3	4.3	4.3	65.7
	Vehicle industry	1	1.4	1.4	67.1
	Cosmetic products	1	1.4	1.4	68.6
	Public utility services	1	1.4	1.4	70.0
	Research instruments	2	2.9	2.9	72.9
	Pension provision	1	1.4	1.4	74.3
	Education	1	1.4	1.4	75.7
	Finances	12	17.1	17.1	92.9
	Advertising	1	1.4	1.4	94.3
	Sports and leisure	3	4.3	4.3	98.6
	Transport	1	1.4	1.4	100.0
	Total	70	100.0	100.0	

Source: edited by the author based on NASDAQ data

question is what correlation can be detected between IPO prices and returns.

Table 3 shows that the IPO had an above-medium effect only on the price on 04.01.2019, based on a two-tailed probe at a significance level of 1 percent. The conclusion here is that the correlation is highly significant, but the IPO price has no substantial effect on return levels.

The table revealed several interesting relationships. There is a correlation between the return since the IPO and return indicators. The strongest correlation is with the return in the first six months, in this case, the correlation coefficient indicates a strong positive relationship, which stayed the same with the price on 04.01 and with the net price change. There is also a very strong correlation between the 30-day and 60-day return levels; the value of the correlation coefficient exceeds 0.7.

Table 2

DESCRIPTIVE STATISTICS TABLE OF RETURN INDICATORS

		IPO price	1st day return	Return in the first 30 days	Return in the first 60 days	Return in the first six months	Price change since the IPO (04. 01. 2019)	Price on 04. 01. 2019	Return since IPO
N	Valid	70.0000	70.0000	67.0000	68.0000	68.0000	67.0000	67.0000	70.0000
	Missing	0.0000	0.0000	3.0000	2.0000	2.0000	3.0000	3.0000	0.0000
Mean		15.9974	18.8970	13.0700	15.3300	13.3500	1.3019	21.5437	5.6400
Median		15.0000	2.3850	6.7900	9.4400	3.7500	0.9233	14.0000	1.6000
Std. Deviation		13.7553	68.3423	25.2420	31.1690	42.1760	1.3369	24.8566	49.0670
Minimum		4.0000	–24.5000	–40.0000	–36.0000	–51.0000	0.0400	0.1800	–81.0000
Maximum		119.3200	541.8000	87.0000	113.0000	175.0000	6.5500	126.1900	178.0000
Percentiles	10	8.0000	–9.4500	–11.3300	–17.9100	–30.3300	0.1496	1.6920	–47.5800
	20	10.0000	–3.3620	–4.8300	–8.9500	–20.2400	0.3062	4.3340	–35.3300
	25	10.0000	-0.3500	–2.6700	–5.4100	–13.4400	0.4456	5.0500	–28.9600
	30	11.0000	0.0000	–1.1000	0.4700	–9.3600	0.5053	7.4260	–24.2000
	40	13.2000	0.4400	1.0500	3.1400	0.0800	0.7371	10.0560	–11.5500
	50	15.0000	2.3850	6.7900	9.4400	3.7500	0.9233	14.0000	1.6000
	60	16.0000	7.7780	12.6900	14.5500	10.2200	1.0316	16.7840	5.2200
	70	17.0000	13.6190	22.9700	23.5300	24.4700	1.3063	21.6380	23.1000
	75	18.0000	15.3600	25.1200	26.2500	28.8400	1.4862	30.2700	29.3400
	80	18.8000	23.5880	31.4600	33.7300	37.3800	1.9985	35.9000	42.5300
	90	22.0000	52.5410	53.1900	61.9000	76.4300	3.6534	56.2540	75.6800

Source: SPSS output

Table 4 examines the variance analysis and its prerequisite. Table 4 examines IPOs according to the 20 industries defined in Table 1. Three industries are significant: There are 13 firms from biotechnology, 12 from finance and 10 from IT, which is exactly 50 percent of all the data examined (see Table 1). The bottom table of Table 4 shows whether the datasets are suitable for running a variance analysis, the condition of which is that the significance levels must be above 5% for the IPO price, the return since IPO, the first-day return and the price on 04. 01. 2019.

The top table shows significant difference when the significance level of the *F*-test is below 5 percent. The IPO price, the 30-day return and the price on 04. 01. 2019 meet this condition. In this case it can be shown that as a result of industry characteristics, there are significant differences between prices and returns.

Table 3

CORRELATIONS

Correlations									
		IPO price	**Return since IPO**	**1st day return**	**Return in the first 30 days**	**Return in the first 60 days**	**Return in the first six months**	**Price on 04. 01. 2019**	**Change**
IPO price	Pearson Correlation	1,000	0,098	-0,103	0,021	0,034	0,063	0,592**	0,020
	Sig. (2-tailed)		0,420	0,398	0,866	0,784	0,610	0,000	0,873
	N	70,000	70,000	70,000	67,000	68,000	68,000	67,000	67,000
Return since IPO	Pearson Correlation	0,098	1,000	-0,004	0,465**	0,474**	0,824**	0,626**	0,703**
	Sig. (2-tailed)	0,420		0,977	0,000	0,000	0,000	0,000	0,000
	N	70,000	70,000	70,000	67,000	68,000	68,000	67,000	67,000
1st day return	Pearson Correlation	-0,103	-0,004	1,000	0,233	0,181	0,040	0,021	0,040
	Sig. (2-tailed)	0,398	0,977		0,058	0,140	0,747	0,867	0,751
	N	70,000	70,000	70,000	67,000	68,000	68,000	67,000	67,000
Return in the first 30 days	Pearson Correlation	0,021	0,465**	0,233	1,000	0,887**	0,549**	0,350**	0,408**
	Sig. (2-tailed)	0,866	0,000	0,058		0,000	0,000	0,004	0,001
	N	67,000	67,000	67,000	67,000	65,000	66,000	65,000	65,000
Return in the first 60 days	Pearson Correlation	0,034	0,474**	0,181	0,887**	1,000	0,600**	0,319**	0,369**
	Sig. (2-tailed)	0,784	0,000	0,140	0,000		0,000	0,009	0,002
	N	68,000	68,000	68,000	65,000	68,000	66,000	66,000	66,000
Return in the first six months	Pearson Correlation	0,063	0,824**	0,040	0,549**	0,600**	1,000	0,460**	0,536**
	Sig. (2-tailed)	0,610	0,000	0,747	0,000	0,000		0,000	0,000
	N	68,000	68,000	68,000	66,000	66,000	68,000	65,000	65,000
Price on 04.01.2019	Pearson Correlation	0,592**	0,626**	0,021	0,350**	0,319**	0,460**	1,000	0,796**
	Sig. (2-tailed)	0,000	0,000	0,867	0,004	0,009	0,000		0,000
	N	67,000	67,000	67,000	65,000	66,000	65,000	67,000	67,000
Price change since the IPO (04.01.2019)	Pearson Correlation	0,020	0,703**	0,040	0,408**	0,369**	0,536**	0,796**	1,000
	Sig. (2-tailed)	0,873	0,000	0,751	0,001	0,002	0,000	0,000	
	N	67,000	67,000	67,000	65,000	66,000	65,000	67,000	67,000

Note: ** Correlation is significant at the 0.01 level (2-tailed)

Source: SPSS output

Table 4

ANOVA TABLE AND THE RESULT OF THE LEVENE'S TEST

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
IPO price	Between Groups	1,613.265	19.000	84.909	0.371	0.040
	Within Groups	11,442.007	50.000	228.840		
	Total	13,055.272	69.000			
Return since IPO	Between Groups	44,056.648	19.000	2,318.771	0.950	0.530
	Within Groups	122,068.385	50.000	2,441.368		
	Total	166,125.033	69.000			
1st day return	Between Groups	33,216.574	19.000	1,748.241	0.302	0.997
	Within Groups	289,059.193	50.000	5,781.184		
	Total	322,275.767	69.000			
Return in the first 30 days	Between Groups	17,577.362	19.000	925.124	1.776	0.046
	Within Groups	24,476.154	47.000	520.769		
	Total	42,053.516	66.000			
Return in the first 60 days	Between Groups	21,021.773	19.000	1,106.409	1.205	0.293
	Within Groups	44,067.815	48.000	918.079		
	Total	65,089.589	67.000			
Return in the first six months	Between Groups	27,587.484	19.000	1,451.973	0.761	0.738
	Within Groups	91,595.073	48.000	1,908.231		
	Total	119,182.556	67.000			
Price on 04.01.2019	Between Groups	7,284.910	19.000	383.416	0.538	0.029
	Within Groups	33,493.236	47.000	712.622		
	Total	40,778.146	66.000			
Delta	Between Groups	26.173	19.000	1.378	0.705	0.795
	Within Groups	91.789	47.000	1.953		
	Total	117.961	66.000			

Test of Homogeneity of Variances				
	Levene Statistic	df1	df2	Sig.
IPO price	1.297	9	50	0.262
Return since IPO	1.672	9	50	0.121
1st day return	1.378	9	50	0.223
Return in the first 30 days	4.173	9	47	0.001
Return in the first 60 days	3.092	9	48	0.005
Return in the first six months	4.161	9	48	0.001
Price on 04.01.2019	1.437	9	47	0.200
Price change	3.513	9	47	0.002

Source: SPSS output

Post-hoc tests have proven that in the case of the IPO price, the stock price of the company providing pension insurance services is significantly different from companies in other industries. In the case of the return in the first thirty days, the cosmetics company and the sports and leisure companies have significantly different values from the other firms.

In the case of the current price, only the advertising firm has a significantly different value from companies in other industries.

Conclusions

Descriptive statistics have clearly shown that for a significant part of the companies the stock market launch was not successful, as shares generated a negative return for investors and owners, and according to the stock prices, the assets of owners decreased by 60 percent from their initial investment.

At the first hypothesis, a partial correlation was established, but the IPO price has no effect on later returns mostly. It has been confirmed, however, that performances move in the same direction, which means return levels are correlated, and if a company's performance is good in the first thirty days, it is likely to be successful in the future as well in terms of returns.

The second hypothesis has been partly confirmed, differences among sectors, stock prices and returns have only been found in a few cases. *(See Table 5)*

CONCLUSION

The study examined the IPOs in the previous six months before 31 January 2017 on NASDAQ, the largest stock exchange in the world representing the tech sector. The question to explore was whether the price movements in the first six months provide a solid prediction for the success of the IPO.

In the course of the analysis, it was found that in the sample of 70 IPOs over the course of almost a year, there was no significant correlation between the long-term success of IPOs and the price movements in the first six months. However, it can be established regarding the various industries, that the general decline in the raw material and energy sectors in the past year clearly had an impact on the price movements after the analysed issues. The performance of the IT sector, which is dominated by the FAANG stocks, had the opposite effect: It clearly had a positive effect on the price movements of the new firms in this industry after their IPO. Statistical analysis confirmed this in the analysis of three hypotheses.

However, many activities may take place with the aim to ensure the long term equilibrium of supply and demand that are independent from the performance of the company yet affect the price. Due to the increased expectations, special attention from investors and major media coverage, this six-month period is important for former, current and especial-

Table 5

RESULTS OF THE HYPOTHESIS TESTING

Research question	Accepted
Hypothesis H1	Partially accepted
Hypothesis H2	Partially accepted

Source: own research

ly future owners of the company. This means that the activities of the demand side on the first day is mostly rooted in irrationality, not rational consideration, as stakeholders experience a euphoria because of the once in a lifetime opportunity. The syndicate handling the IPO on the capital market can maintain the price to help mitigate price volatility. The *lock-up period* is equally important as it prevents the flooding of the market and the negative consequences that would entail. These are legal and regulated methods to influence supply and demand. These can influence price movements in the short term, but the long term trust of investors and the steady growth of the stock price are based on the long-term success of the company's business plan, i.e. whether the planned market share and profit volume are achieved.

Notes

[1] NASDAQ (National Association of Securities Dealers Automated Quotations), the first electronic stock market, began trading in 1971. Today, it is the second largest stock exchange in the US in terms of trade volume.

[2] John Muth (1930–2005), an American mathematician and economist, was affiliated with Carnegie Mellon University in his research. He published his study, Rational Expectations and Theory of Price Movements in 1961, in which he described the theory of rational expectations. According to this theory, informed expectations of professionals in a certain field are essentially the same as the predictions of the relevant economic theory. Even though this theory was created in the context of microeconomics, it had a significant impact on macroeconomics as well.

[3] Smart money: Money controlled by a small number of investors who are always open to make quick profits (see arbitrage) and who do make use of such opportunities.

[4] Spread – the difference between the current best bid and ask prices. The spread depends on the method of market making, the number of market makers and the volume of market transactions. The most visible example of spread is how currency and foreign exchange rates work. At any given moment, there may be a several percent difference between the exchange rates of exchange bureaux, commercial banks and the treasury rates of commercial banks.

[5] When there is a capital market bubble, the price of a given capital market instrument is persistently different from its intrinsic or fundamental value. The reasons for this lie in the structure of the markets, and especially in the behaviour of market operators. A new branch of economics, behavioural economics, studies this latter issue. Instead of accepting the concept of a *homo economicus* who takes rational decisions, behavioural economics studies how economic decisions made by market operators are determined by emotions and sometimes non-rational behavioural models.

[6] NASDAQ (National Association of Securities Dealers Automated Quotations) was established in 1971 as a result of the digital revolution. This can be interpreted as the dawning of the whole age of electronic trading. On the terminals of the computer system, the best orders of the market makers and security traders are displayed. Accumulated data is updated in real time and is accessible on three different levels through the terminals. In 2007, the stock exchange merged with OMX AB (Aktiebolaget Optionsmäklarna/Helsinki Stock Exchange), a Finnish–Swedish financial ser-

vice provider that operates eight stock exchanges in Northern Europe (Copenhagen, Stockholm, Helsinki and Iceland), in the Baltic states (Tallinn, Riga and Vilnius) and an alternative stock exchange for companies with smaller capitalisation. In 2013 it purchased Thomson Reuters, a financial information company, and in 2015 Dorsey Wright & Associates LLC, an index provider and data analysis firm.

[7] FAANG stocks are the stocks of the leading global tech firms. It is an acronym from the ticker symbols (that identifies the stock on the stock exchange) of Facebook, Amazon, Apple, Netflix and Google. These companies, as opposed to the previous tech bubble, became the key actors on their markets as they had significant profit-generating ability, *disruptive* technologies that can be used widely and that completely trumped previous solutions, and a business model that used this technology effectively.

[8] For more details on ETFs see Bujtár, Zsolt (2016). Eladó az egész világ? Avagy – ETF-k szabályozási kérdései (Is the whole world for sale? Regulatory issues of ETFs). *JURA* Vol. 22 Issue 1 pp. 171–181

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