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IPO Performance and Financial Crises

Evidence from the Finnish Market

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ABSTRACT:

Initial Public Offering (IPO) is a process through which a privately held company seeks to become publicly traded by selling its stocks to the public for the first time. Over the past few decades, IPOs have garnered considerable interest from finance professionals, including researchers and investors. This attention has been directed towards assessing both the short-term and long-term performance of IPOs. This study aims to investigate the pricing of Finnish IPOs during and outside of periods of financial crises. Two hypotheses are formulated to guide the investigation. H1 posits that underpricing of IPOs is more prevalent during financial crises, reflecting heightened market volatility and investor risk aversion. H2 proposes that IPOs executed during financial crises underperform the market, indicating potential challenges and uncertainties newly listed companies face during economic downturns. Through empirical analysis and event study methodology, this research seeks to provide insights into the dynamics of IPO pricing and performance amidst financial crises, contributing to understanding investor behaviour and market efficiency. This study contributes to the existing literature since prior research focuses on global or US-focused IPO samples. In contrast, the effects may differ in Finland due to the unique characteristics of the Finnish market, such as market size, economic dependence, investor behaviour and regulatory environment. The purpose of this study is to observe the listings done during both normal and exceptional financial times. The sample size is 89 Finnish IPOs and will be examined using an event study methodology.

The study shows that IPOs executed during financial crises tend to be underpriced, thus offering exceptional short-term returns compared to all Finnish IPOs on average. In the long term, however, IPOs executed during crisis periods exhibit negative abnormal returns. This study provides valuable insights into the dynamics of IPOs within the Finnish market landscape, shedding light on the implications of financial crises on IPO performance and investor behaviour. By analysing IPOs within the context of financial crises, this study offers practical implications for policymakers, investors, and companies navigating volatile market conditions and offers opportunities for future research.

KEYWORDS: Financial crisis, IPO, initial public offering, underpricing, underperformance, event study

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TIIVISTELMÄ:

Listautumisanti on prosessi, jonka kautta yksityisesti omistettu yritys pyrkii tulemaan julkisesti noteeratuksi. Listautumisannissa yritys tuo osakkeensa julkisen kaupankäynnin kohteeksi pörssiin. Viime vuosikymmeninä listautumisanteihin on kohdistunut merkittävää kiinnostusta rahoitusalan ammattilaisten, kuten tutkijoiden ja sijoittajien, keskuudessa. Huomio on kohdistunut listautumisantien lyhyen ja pitkän aikavälin suorituskyvyn arviointiin. Tämä tutkimus pyrkii tutkimaan suomalaisten listautumisantien hinnoittelua sekä finanssikriisien että tavallisten taloudellisten aikojen aikana. Tässä tutkimuksessa muodostetaan kaksi hypoteesia. H1 esittää, että listautumisantien alihinnoittelu on yleisempää finanssikriisien aikana, mikä heijastaisi markkinoiden lisääntyneitä volatiliteettia ja sijoittajien taipumusta välttää riskiä. H2 puolestaan esittää, että kriisiaikoina toteutetut listautumisannit alisuoriutuvat markkinoihin nähden. Tutkimus hyödyntää empiiristä analyysiä ja pyrkii tarjoamaan näkemyksiä listautumisantien hinnoittelusta ja suoriutumisesta finanssikriisien aikana. Tämä tutkimus tukee aikaisempaa kirjallisuutta tuoden samalla lisäarvoa keskittymällä ainoastaan suomalaisiin listautumisanteihin. Tutkimus ottaa huomioon suomalaisten rahoitusmarkkinoiden ainutlaatuiset ominaisuudet, kuten markkinoiden koon, sijoittajien käyttäytymisen sekä sääntelyn. Tämän tutkimuksen tarkoituksena on analysoida ja vertailla listautumisia, jotka ovat toteutuneet normaaleina sekä taloudellisesti poikkeuksellisina aikoina. Tutkimusaineisto käsittää 89 suomalaista vuosien 2000-2023 aikana tehtyä listautumisantia ja käytetty menetelmä on tapahtumatutkimus.

Tämän tutkimuksen tulokset osoittavat, että taloudellisesti epävarmoina aikoina toteutetut listautumiset ovat taipuvaisia olemaan alihinnoiteltuja, tarjoten siten poikkeuksellisen hyviä lyhyen aikavälin tuottoja verrattuna suomalaisiin listautumisiin keskimäärin. Pitkällä aikavälillä tarkasteltuna finanssikriisien aikana toteutetut listautumisannit osoittavat kuitenkin negatiivisia tuottoja suhteessa markkinan kehitykseen. Tämä tutkimus tarjoaa arvokkaita näkemyksiä listautumisantien dynamiikasta suomalaisessa markkinaympäristössä, avaten finanssikriisien vaikutuksia listautumisten taloudelliseen suoriutumiseen ja sijoittajien käyttäytymiseen.

AVAINSANAT: Finanssikriisi, listautumisanti, alihinnoittelu, alisuoriutuminen, tapahtumatutkimus

Table of Contents

1	Introduction	10
1.1	Purpose of the Study	11
1.2	Hypotheses of the Study	12
1.3	Structure of the Study	13
2	Initial Public Offerings	15
2.1	Costs of Going Public	17
2.2	The valuation of an IPO	18
3	Determinants of Stock Prices	21
3.1	Modern Portfolio Theory	21
3.2	Capital Market Efficiency	22
3.3	The Efficient Market Hypothesis (EMH)	22
3.4	Valuation Models	23
3.4.1	Capital Asset Pricing Model (CAPM)	24
3.4.2	Arbitrage Pricing Theory (APT)	24
3.4.3	Dividend Discount Model (DDM)	24
3.4.4	Discounted Free Cash Flow Model (DCF)	25
3.4.5	Fundamental Variables	25
3.5	Performance of IPOs	25
4	Financial Crises	29
4.1	Global Financial Crisis and Eurozone Debt Crisis	29
4.2	COVID-19 Pandemic in the Euro Area	31
5	Data and Methodology	34
5.1	Data Description	34
5.2	Methodology	38
5.3	Methodological Constraints	38
5.4	Market-adjusted model	40
6	Results and Discussion	44
6.1	IPOs during normal times	46

7	Conclusion	55
7.1	Further research	57
	References	59

List of Figures and Tables

Tables

Table 1. IPOs in OMX Helsinki during 2000-2023	35
Table 2. IPOs in OMX Helsinki during normal economic times and financial crises	35
Table 3. Finnish IPOs based on year of execution and the economic environment	36
Table 4. Descriptive statistics of IPOs listed during financial crises after one day	45
Table 5. Descriptive statistics of IPOs listed during financial crises after one week	45
Table 6. Descriptive statistics of IPOs listed during financial crises after one year	46
Table 7. Descriptive statistics of IPOs listed during normal times after one day	46
Table 8. Descriptive statistics of IPOs listed during normal times after one week	47
Table 9. Descriptive statistics of IPOs listed during normal times after one year	47

Figures

Figure 1. Average underpricing of U.S. IPOs 1980-2017 (Ritter, 2019)	20
Figure 2. Share price behaviour during the COVID-19 Crisis (Bank of Finland, 2021)	32
Figure 3. Average returns of IPOs 1, 7 and 365 days after the listing day	38
Figure 4. Average abnormal returns of IPOs 1, 7 and 365 days after the listing day	52
Figure 5. Average market returns 1, 7 and 365 days after the listing of observed IPOs	54

1 Introduction

Financial crises have been a recurring feature of the global economy, causing significant disruptions and instabilities across various sectors. These crises have underscored the importance of understanding the dynamics of financial markets and their impact on key economic indicators. One area of particular interest within financial markets is the Initial Public Offering (IPO) market. An IPO is the process through which a company sells its stock to the public for the first time, transforming it from a privately held to a publicly listed corporation Kim & Weisbach (2008). According to Zingales (1995), in an IPO, the firm issues new shares to raise capital, which individual and institutional investors make available for purchase on a stock exchange. IPOs represent a critical mechanism through which companies raise capital by offering their shares to the public for the first time. The underpricing and long-run performance of IPOs have received substantial attention from researchers and practitioners alike, as they serve as barometers of market efficiency and provide insights into investor behaviour.

The period surrounding financial crises is of particular interest due to the heightened levels of market uncertainty, increased risk aversion, and fluctuations in investor sentiment. Prior research has examined the relationship between financial crises and IPO underpricing and performance, revealing intriguing patterns and dynamics.

The impact of financial crises on IPO prices has been researched from various angles. Most studies, including a paper from Nelson et al. (2014), have concentrated on businesses' risk and performance differentials during challenging economic times. This thesis will use data from Finnish IPOs to focus on the abovementioned anomalies. This thesis aims to connect these events to the underpricing of IPO businesses. In summary, the aim is to determine whether IPO companies' pricing and performance are affected by financial crises and the uncertainty around them.

1.1 Purpose of the Study

This master's thesis aims to contribute to the existing body of knowledge by comprehensively investigating the impact of financial crises on the underpricing and long-run performance of IPOs. It seeks to explore the underlying mechanisms and factors influencing IPO underpricing during crisis periods and analyse how these factors interact with broader market conditions. This thesis will analyse and conclude data from the Finnish market and observe the most recent financial crises, including the global financial crisis (2007-2008) and the stock market crash due to COVID-19 (2020). Additionally, this study aims to assess the long-term performance of IPOs before and after financial crises, considering both short- and long-term perspectives.

To achieve these objectives, this thesis will analyse two groups consisting of Finnish companies that have gone through an IPO in the past 20 years. The first group includes companies that went public during one of the two observed financial crises. The second group consists of companies that went public during times in which a financial asset had not lost a significant portion of its nominal value. This paper will reference these periods of financial stability and economic prosperity as normal economic periods. During such times, the economy experiences growth, stability in financial markets, and increased investor confidence. (Sanstad et al., 1994).

The goal is to assess both short- and long-term performance. The first-day return horizon is utilised in the short term. A one-year timeframe is employed for more extended performance. The short-run performance is evaluated using a market-adjusted approach. Long-run performance is assessed using market-adjusted returns.

The findings of this research will have practical implications for various stakeholders, including regulators, investors, and researchers. A deeper understanding of the relationship between financial crises and IPO dynamics, especially in the Finnish market, can help market participants develop more informed investment strategies and improve risk management practices. The empirical part can be easily extended in many ways.

Choosing the financial crisis of 2007-2008 and the COVID-19 crisis as periods of study was a prudent decision due to their significant impact on financial markets. The 2007-2008 crisis was one of the most severe economic downturns in recent history, characterised by market turmoil, bank failures, and a global recession, and this period provided a unique opportunity to examine IPO pricing and performance amidst extreme market volatility and investor uncertainty (Erkens et al., 2012). Similarly, according to Mazumder & Saha (2021), the COVID-19 crisis, marked by widespread economic disruption and market shocks, offered a contemporary context to analyse IPO behaviour during times of crisis. By studying these two distinct crises, this thesis aims to capture different aspects of market reactions, investor sentiment, and the resilience of IPOs under varying economic conditions. Existing literature, e.g. studies by Niculaescu et al. (2023) and Passador (2021), have focused on the same periods due to their profound impact on financial markets and investor behaviour.

1.2 Hypotheses of the Study

Previous research indicates that IPOs are significantly underpriced on average. According to Ritter (1991) and Bessler & Thies (2007), after an IPO, the stock price is usually higher than the offering price on the first day of trading. Therefore, in the short term, the shares issued in an initial public offering have performed better than the market. Underpricing of IPOs is a well-studied phenomenon globally. However, there is a smaller quantity of evidence from the Finnish market specifically. For example, studies from Hahl et al. (2019), Ljungqvist (2007), and Suhonen (2021) suggest that Finnish IPOs also experience underpricing, albeit to varying degrees. Several hypotheses have been advanced to explain the underpricing of initial public offerings and long-term underperformance. The most popular explanations for the underpricing anomaly are knowledge asymmetry between the parties participating in the IPO and irrational investor behaviour (Ljungqvist, 2009). According to Malkiel (2003), Some investors exhibit less rational behaviour, leading to the pricing of IPOs that may not fully reflect recent news and information.

While there is a large amount of study on the factors of IPO underpricing and the effects of the financial crisis independently, little attention has been paid to the relationship between the financial crisis and a firm's fundraising costs or IPO underpricing issues (Li et al., 2018). The paper by Ritter (1987) states that IPO underpricing is regarded as an indirect cost for firms during the process of capital funding. It also demonstrates how increased information disclosure before IPOs might lower the cost of capital fundraising in the US stock market.

Amidst the backdrop of a financial crisis, companies often navigate the delicate balance of attracting investor interest while ensuring the viability of their IPOs (Korkeamäki & Koskinen, 2009). In such turbulent times, the decision to underprice an Initial Public Offering becomes a strategic manoeuvre to mitigate investor risk aversion and bolster market confidence. Existing studies by Jamaani & Alidaorus (2019) and Katti & Phani (2016) explain how companies seek to create immediate demand, secure necessary capital infusion, and signal resilience amidst economic uncertainty by offering shares at a price lower than their perceived value. This deliberate underpricing, while potentially leaving money on the table, is a calculated step to navigate the challenging landscape of a crisis-stricken market. This paper aims to find whether financial crises have a notable effect on the underpricing of IPOs. Thus, we can formulate Hypothesis 1 and 2:

H1: The underpricing of IPOs occurs more often during financial crises.

H2: IPOs executed during a financial crisis are outperformed by the market.

1.3 Structure of the Study

The structure of this paper consists of a theoretical part and an empirical part. The first chapter briefly concludes the purpose of the study. The second chapter continues by describing the framework for the study. It introduces IPOs, financial crises, and the typical characteristics of the Finnish market. The third chapter follows by focusing on stock

prices and the determining factors. After going through the classic stock valuation models and methods, the principles of pricing IPOs will be discussed. Then, the fourth chapter will further contribute to the empirical part by combining aspects of the financial crises and IPO pricing.

The empirical part's composition begins in the thesis's fifth chapter. First, to introduce the study's methodology, the paper will review the data used for the analysis. Then, the necessary categories of IPOs will be introduced. The sixth part will include findings of the research based on the analysis conducted. This section involves organising and presenting the data collected and analysed during this study. After the results, the findings will be discussed, and the conclusion will be made.

2 Initial Public Offerings

Companies raise capital for financing investments through an Initial Public Offering (IPO). Kim & Weisbach (2008) studied 17,226 IPOs from 38 countries between 1990 and 2003. They found that one year after the IPO, for every dollar raised through the offering, the funds allocated to research and development had increased by 18.5 cents, capital expenditures by 9.9 cents, inventory by 1.9 cents, and funds for acquisitions by 3.2 cents. Three years after the IPO, the investments in these areas had increased to 60.7 cents, 22 cents, 4.1 cents, and 4.7 cents, respectively. This indicates that companies do not immediately utilise the capital from IPOs but rather save and use it in the future (Kim & Weisbach, 2008).

Zingales (1995) suggests that owners' desire to change a company's ownership structure by selling their own shares while maximising their income is a reason for companies to go public. Company owners may take advantage of the knowledge that the company's future cash flows are positive (Zingales, 1995). When going public, the company's owners receive a better return on their shares because the share value is likely to increase after the IPO. However, future cash flows could potentially be negative. Erkkilä (2018) points out that investors should be cautious when old owners sell significant portions of shares during an IPO. Erkkilä (2018) gives the example of Rovio, which went public in 2017. Rovio released its guidance for 2018 in February 2018, and the future outlook presented in the publication appeared weaker than expected, leading to a nearly 50% decline in Rovio's market capitalisation. According to DeGeorge et al. (2007) and Lowry & Schwert (2004), company owners aiming to maximise profit and generate hype in an IPO must carefully consider the pricing strategy. Pricing shares attractively below perceived intrinsic value can stimulate investor demand and create excitement, driving up short-term share prices. However, overpricing can deter investors and lead to a lacklustre market debut. Conversely, pricing shares too low may undervalue the company and signal a lack of confidence.

Rydqvist and Högholm (1995) examined IPOs in Sweden during the 1980s and found that before going public, majority owners of companies owned an average of 90% of the company's shares. Immediately after the IPO, the original majority owners' ownership in the companies dropped to 57%. Five years later, their ownership in the listed companies was 36%. However, Ehrhardt and Nowak (2003) argue that the change in ownership structure is not as significant in family-owned companies. They studied IPOs of family-owned companies in Germany between 1970 and 1990 and found that ten years after going public, families still owned the majority of shares in 60% of the companies.

Going public provides liquidity for a company's shares. It is challenging for shareholders of privately held companies to sell their shares because finding buyers can be difficult. Trading shares of a listed company is cheaper and faster. With increased liquidity, company owners can sell some of their shares and reinvest the proceeds. This allows owners to diversify their stock portfolios and manage risk (Pagano et al., 1998). Brau and Fawcett (2006) surveyed 87 financial officers of publicly traded companies. Half of the financial officers agreed or strongly agreed that one of the motivations for going public was to enhance the company's reputation and visibility. Going public serves as an advertisement for the company, attracting investors who may not have heard of the company previously (Pagano et al., 1998; Merton, 1987; Korkeamäki & Koskinen, 2009). Publicity from going public can also aid recruiting efforts (Korkeamäki & Koskinen, 2009). Merton (1987) demonstrated that the company's share value increases with a broader investor base.

Kadlec and McDonnell (1994) found in their study that listed companies' shares generated an average of 5% abnormal returns after announcing their decision to cross-list on the New York Stock Exchange. In Finland, Juhani Elomaa, the CEO of Taaleri Oyj, mentioned in an interview with Pörssisäätiö (2016) the reasons for Taaleri's decision to go public. Elomaa stated that being listed on the stock exchange increases visibility for their company, which helps attract institutional investors and improves trading activity and share price determination. The CEOs of Asiakastieto Oyj and Verkkokauppa.com Oyj also

mentioned in interviews that going public was primarily motivated by increasing visibility and publicity (Pörssisäätiö, 2016; Pörssisäätiö, 2014).

Publicly traded companies have access to diverse sources of financing, which reduces financing costs (Pörssisäätiö, 2014). Listed companies can also conduct additional share offerings, allowing them to influence their capital structure (Korkeamäki & Koskinen, 2009). Going public can allow companies to acquire external capital at a lower cost (Pagano et al., 1998). After going public, a company's information becomes public, making it easier and cheaper for lenders to assess the company's creditworthiness because the disclosure requirements associated with public status reduce lenders' risks (Pagano et al., 1998; Rajan, 1992; Pörssisäätiö, 2014). Pagano et al. (1998) studied IPOs in Italy from 1982 to 1992 and found that external capital costs decrease when a company goes public. The cost of external capital decreased by an average of 30-55 basis points in the first year after going public.

2.1 Costs of Going Public

Going public involves fixed costs, such as fees for the IPO organiser. In addition to these fixed costs, companies incur annual variable costs related to being listed on the stock exchange, such as increased reporting obligations (Pagano et al., 1998; Korkeamäki & Koskinen, 2009). Ritter (1987) studied the costs of going public in the United States in the 1980s and found that fixed costs were, on average, \$250,000, with variable costs accounting for 7% of the proceeds from the IPO.

Hämäläinen (2017) interviewed Pekka Suhonen, the head of IPOs at OP Financial Group, who mentioned that going public in Finland typically costs a company around 5% of the funds raised during the IPO. Companies going public are required to disclose their estimated total costs in the listing prospectus, as demonstrated by Silmäasema Oyj, which went public in 2017 with estimated total costs of four million euros (OP, 2017). In the previous year, DNA Oyj conducted a larger IPO, with estimated total costs of 12 million

euros (Danske Bank, 2016). In addition to the direct costs associated with the IPO, publicly traded companies may incur costs related to increased reporting obligations. Listed companies must increase their reporting, a burden that privately held companies would not voluntarily undertake (Korkeamäki & Koskinen, 2009). Increased reporting obligations may force listed companies to disclose their future research and development projects (Ritter, 1987). This can be a concern for companies seeking to protect their technological and strategic advantages (Rydqvist & Högholm, 1995; Bower & Christensen, 1995). Moreover, Pagano et al. (1998) found that a company's external capital costs decrease when it goes public, which means that the benefits outweigh the costs. Ritter (1987) argued that the costs of going public have reduced over time due to changes in the regulatory environment and technological advances.

Publicly traded companies are also subject to disclosure obligations, which require the company to provide public information regarding, among other things, the company's financial situation and insider transactions. The business has expenses associated with providing these services. (Pagano and others, 1998) A small firm's listing costs are comparatively more significant than those of a large company since some expenditures are fixed. It has been discovered that this is one factor that makes big businesses more likely than small businesses to go public (Noguer, 2004). In upcoming ventures, accessing capital for diverse investments may become more convenient once a company has undergone the process of going public. BrauBrau and Fawcett (2006) outlined that the consideration driving the decision to pursue an initial public offering (IPO) is the potential utilisation of public shares for future acquisitions. Contrary to common assumptions, the current or anticipated cost of capital ranks outside the top three reasons motivating companies to go public (Brau & Fawcett, 2006).

2.2 The valuation of an IPO

Determining the issue price is a critical step in the initial public offering (IPO) process for a firm that wishes to go public. The issuing company typically hires investment bankers

for a firm valuation (Roosenboom, 2014). Investment bankers have a wealth of experience conducting initial public offerings (IPOs), giving them invaluable insights into the issuance process (Ibbotson & Ritter, 1995).

Valuing an initial public offering (IPO) typically involves three main methods. Firstly, the multiple valuation methods are commonly employed, where various multiples of the issuing company are compared to those of similar counterparts on the stock exchange (Kim & Ritter, 1999; Purnanandam & Swaminathan, 2004). In a sample analysed by Roosenboom (2014), approximately 83.77% of underwriters used the price-earnings ratio, making it the most frequently utilised method among 228 companies that went public on the French stock exchange between 1990 and 1999.

Secondly, the discounted cash flow (DCF) method is widely utilised for analysing companies entering the stock exchange despite being less prevalent in academic literature (Mills, 2005; Kaplan & Ruback, 1995; Roosenboom, 2014). This method, employed by 59.21% of underwriters in Roosenboom's sample, offers accurate results and is commonly practised.

The third method, the dividend discount model, is often used for companies with a relatively older profile operating in mature industries (Roosenboom, 2014). In the same study, the dividend discount model was the second most utilised valuation method, with 52.91% of underwriters relying on it. It exhibited the highest explanatory power among the valuation techniques analysed.

Combining multiple valuation methods with projected earnings yields more accurate valuations than relying solely on historical multiples (Kim & Ritter, 1999). Investment bankers play a crucial role in this process, as they deeply understand fundamental analysis and can predict future market prices using methods like DCF (Kim & Ritter, 1999). Consequently, they contribute to making the stock exchange more efficient by valuing entering companies more precisely than by mechanical analysis alone.

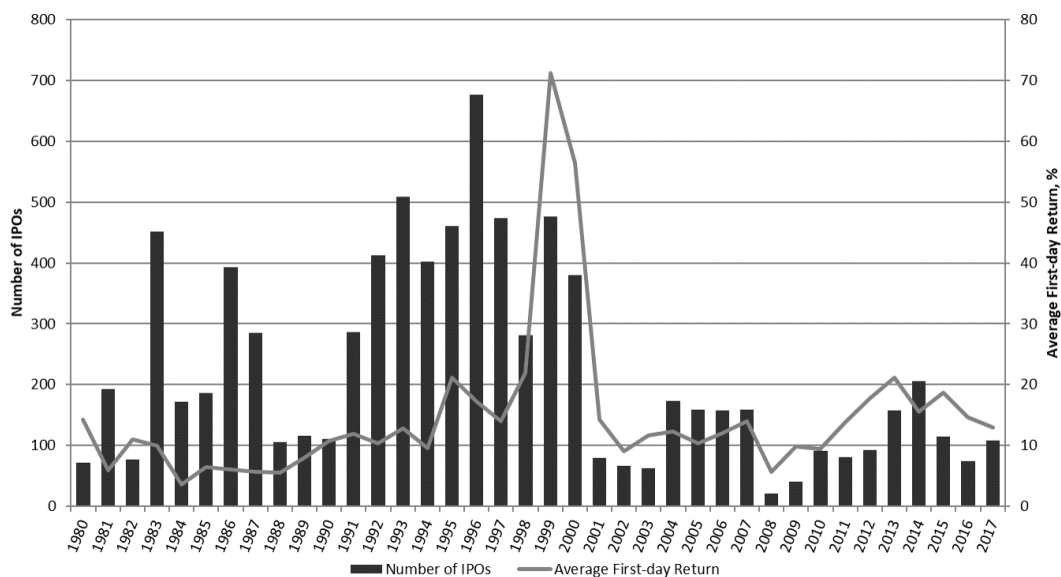


Figure 1. Average underpricing of U.S. IPOs 1980-2017 (Ritter, 2019)

According to Ritter (2019), the consensus on IPO underpricing is that it is a prevalent phenomenon in financial markets worldwide. IPO underpricing refers to the tendency for the market price of newly issued shares to rise sharply on the first day of trading, resulting in investors receiving lower prices than the intrinsic value of the shares. The phenomenon can be established by observing the IPOs of all U.S. companies from 1980 to 2017.

In Figure 1 by Ritter (2019), the line illustrates the average return achieved by IPO investors historically. This return represents the difference between buying shares at the issuing price on the primary market and selling them at the close of the first day of trading on the secondary market. According to Ritter (2019), on average, this initial-day return amounts to approximately 15%. In other words, investors who participate in IPOs and sell their shares the following day typically realise a 15% return. This investment strategy appears highly profitable.

3 Determinants of Stock Prices

It is essential to delve into established financial theories to gain a comprehensive understanding of stock price behaviour and the dynamics of IPO stock prices. In this chapter, the paper introduces fundamental concepts of modern financial theory and expounds on market efficiency studies. Firstly, we will delve into modern portfolio theory (MPT), which provides insights into constructing portfolios with minimised risk for a given level of expected return. Subsequently, we will explore capital market efficiency, which underpins the efficient market hypothesis and associated research. Lastly, this chapter introduces general stock valuation models used to determine a stock's fair value.

3.1 Modern Portfolio Theory

Stock prices and risk are inseparable, with investment decisions invariably involving a trade-off between risk and return. In this context, risk is defined as the likelihood that an investment's actual return deviates from its expected return. Rational investors seek opportunities where the expected return justifies the associated risk. Risk can be divided into two components: systematic risk (or market risk) and unsystematic risk (also known as diversifiable or specific risk). Systematic risk, influenced by broad factors like economic or geopolitical conditions, is challenging to predict and impossible to avoid. In contrast, unsystematic risk can be mitigated through diversification, where portfolios encompass various investments, including different assets and derivatives (Bodie et al., 2014).

The concept of diversification was pioneered by Markowitz in 1952. He asserted that assessing the risk and return of individual assets should not occur in isolation but within the context of a portfolio. According to Markowitz's modern portfolio theory, a portfolio is considered efficient if it either minimises total risk for a given level of return or max-

imises returns for a given level of risk (Pfaff, 2016). Markowitz's groundbreaking revelation was that selecting assets solely based on their individual characteristics does not guarantee an optimal portfolio. Instead, investors must consider how each asset co-moves with others, enabling the construction of a portfolio with equivalent expected returns but lower risk than one ignoring these interactions (Elton & Gruber, 1997). This rational investor choice leads to selecting portfolios on the efficient frontier, representing the optimal risk-return trade-offs.

3.2 Capital Market Efficiency

Efficient markets are characterised by specific conditions that differ from perfect capital markets, as outlined by Copeland et al. (1983). These conditions encompass transparency, absence of transaction costs or taxes, perfect competition, and universal access to costless and simultaneous information. The sole requirement for market efficiency is that all participants can immediately respond to available information. While no market perfectly fulfils these conditions, greater adherence to them signifies greater market efficiency (Kallunki, 1995).

3.3 The Efficient Market Hypothesis (EMH)

The Efficient Market Hypothesis (EMH), developed by Eugene Fama in 1970, defines an efficient market as one where rational, profit-maximising participants actively compete to predict future market values of securities based on all available information. In such markets, current prices already incorporate the effects of past events and expectations for future events (Fama, 1970).

Fama posits that stocks consistently trade at their intrinsic values because prices react instantly to all available information. This perspective makes it nearly impossible for in-

vestors to consistently "beat the market" by identifying overvalued or undervalued securities. However, this hypothesis has faced opposition, with some arguing that investor irrationality can lead to market inefficiencies (Malkiel, 2003). Still, EMH remains a cornerstone theory in finance, emphasising that stock prices reflect all available information and change primarily in response to news (Fama, 1970).

EMH is categorised into three levels of efficiency. Historical price data are readily available in weak form efficiency, but investors cannot predict future prices based on this data. Semi-strong form efficiency posits that all publicly available information is immediately reflected in stock prices, making it impossible for investors to achieve returns above the market average consistently. In strong form efficiency, all public and private information is factored into stock prices, making it impossible for anyone, even with insider information, to outperform the market consistently. However, strong form efficiency is often considered unattainable in practice (Kallunki, 1995).

3.4 Valuation Models

Valuation involves determining a security's current or expected worth, often facilitated by valuation models. These models yield different results depending on the variables involved in the analysis. The primary goal of valuation is to identify a security's intrinsic or fair value based on factors like earnings, dividends, and expected growth rates (Hitchner, 2011). This chapter offers a foundational understanding of modern financial theories, market efficiency, and various valuation models, providing essential tools for comprehending and analysing stock price behaviour and investment decision-making. The discussion on the determinants of stock prices offers valuable insights into the dynamics of stock market behaviour, which is crucial for understanding the phenomenon of IPO pricing. Modern Portfolio Theory (MPT) elucidates the relationship between risk and return, emphasising the importance of diversification in minimising portfolio risk (Fabozzi et al., 2002). According to Francis & Kim (2013), this theory informs investors' decisions

regarding the composition of their portfolios, which is particularly relevant during financial crises when risk perceptions are heightened.

3.4.1 Capital Asset Pricing Model (CAPM)

The Capital Asset Pricing Model (CAPM) introduced by Sharpe, Lintner, and Mossin in the 1960s calculates the expected returns of securities. It posits that the expected return of a security is equal to the risk-free rate plus a risk premium, with the latter determined by the security's beta (β), representing its sensitivity to market movements (Sharpe, 1964; Lintner, 1965; Mossin, 1966). CAPM is a valuable tool for understanding and evaluating the expected returns and pricing dynamics of IPOs, helping investors and companies make informed decisions in the IPO process (Fama & French, 2013).

3.4.2 Arbitrage Pricing Theory (APT)

Ross's Arbitrage Pricing Theory (APT), proposed in 1976, diverges from CAPM by considering multiple factors, often macroeconomic ones. APT posits that an asset's returns can be predicted based on its relationship with several macroeconomic variables that capture systematic risk. It allows for market mispricing before eventual corrections and offers empirical testability independent of market portfolios (Huberman, 1982).

3.4.3 Dividend Discount Model (DDM)

Myron J. Gordon introduced the Dividend Discount Model (DDM), commonly referred to as the Gordon Growth Model, in 1962. It is a simple valuation technique. It calculates the number of years it will take for earnings to achieve the company's market value and values security by comparing its stock price to its annual earnings (Kallunki et al., 2002).

Nonetheless, the ease of use of DDM may result in misconceptions and incorrect implementations, especially when it comes to the presumption of uninterrupted dividend growth.

3.4.4 Discounted Free Cash Flow Model (DCF)

The Discounted Free Cash Flow Model (DCF) values assets by discounting their expected future cash flows. Unlike DDM, DCF does not rely on dividend policy and is less susceptible to accounting standards. However, DCF depends on accurate estimations of future cash flows, which can be challenging (Hitchner, 2011). The most significant studies on the discounted cash flow approach, a professionally investigated valuation method, are in the eighties and nineties. Fernandez (2005) conducted a discounted cash flow valuation study to examine the financial literature.

3.4.5 Fundamental Variables

Fundamental ratios, also known as fundamental variables, are pivotal in evaluating a company's performance relative to industry peers and over time. Common fundamental ratios include the Price-to-Earnings (P/E) ratio, Price-to-Book (P/B) ratio, and size, which are often indicative of risk (Banz, 1981). These ratios provide valuable insights into a company's valuation and performance, although their interpretations may vary based on growth expectations and market conditions.

3.5 Performance of IPOs

Investors are perpetually pursuing exceptional returns within financial markets, and this quest has unearthed various market anomalies, including the Initial Public Offering (IPO) outlier phenomenon. A multitude of studies, as evidenced by Ritter (1991), Loughran

and Ritter (1995), and others, have demonstrated that IPOs tend to underperform, a phenomenon aptly defined by Welch (2002) and Loughran and Ritter (1995).

The enigma referred to as the "new issues puzzle" is a persistent subject of inquiry in the realm of IPO underperformance. Notable research has delved into this performance differential, generating a corpus of literature to elucidate this phenomenon. One contributing factor to the lacklustre performance of new issues is the propensity for value-eroding acquisitions. In 2012, Brau et al. conducted a comprehensive study that underscored the tendency for IPOs involved in acquisitions to underperform relative to non-acquirers, thus partially elucidating the IPO anomaly.

However, it is essential to note that while value-diminishing acquisitions play a role in the IPO underperformance narrative, they do not provide a complete explanation for this anomaly. In fact, non-acquiring IPOs themselves also exhibit subpar performance, further complicating the intricate dynamics of this phenomenon.

The strategy of underpricing in the context of an initial public offering (IPO) involves setting the IPO price below its intrinsic value before entering the stock market. When the security price rises and closes higher after the first trading day, the IPO is deemed to be underpriced (Ljungqvist, 2007). This underpricing phenomenon can occur intentionally or unintentionally. The underpricing of IPOs has garnered considerable attention in academic literature over the past few decades. Previous research has consistently revealed that a company's stock price tends to trade significantly higher on the first trading day than the IPO price suggests. This phenomenon is often attributed to information asymmetry (Reilly, 1973). Ritter's study in 2017, which examined the US IPO market between 1980 and 2016, found that IPOs were, on average, underpriced by 17.6%.

Notably, during the 1990s, the IPO market in the United States experienced an average underpricing of around 20%, according to Ljungqvist (2007). Hahn et al. (2013) also ob-

served that IPOs in their dataset between 1988 and 2009 exhibited an average underpricing of 27.8%. Boreiko & Lombardo (2011) reported similar results in their Italian dataset spanning from 1999 to 2008, where the average underpricing of IPOs was approximately 12.5%. Comparable findings were observed in the Finnish Stock Market between 1994 and 2006, with a mean abnormal return of 15.6% and a median abnormal initial return of 4.1% for IPOs (Hahl et al., 2014). Another study by Keloharju (1993) found that IPOs on the Helsinki Stock Exchange were underpriced by 8.7% from 1984 to 1989. The question of why underpricing occurs lacks a single definitive answer. However, factors such as increased demand, accidental underpricing, and information asymmetry all contribute to the tendency for IPOs to be underpriced.

The underpricing anomaly has been explained through the lawsuit avoidance hypothesis (Tinic, 1988), which posits that underpricing reduces the likelihood of lawsuits against the issuing company. Recent studies, however, have yielded differing conclusions. Drake and Vetsuypens (1993) did not support the lawsuit avoidance hypothesis, finding no significant reduction in the probability of lawsuits. In contrast, Lin, Pukthuanthong, and Walker (2013) supported Tinic's hypothesis, suggesting that higher legal risk for IPOs led to greater underpricing.

According to Loughran and Ritter (2004), the level of analyst coverage was pivotal in underpricing during the Dotcom bubble of the early 2000s. Additionally, CEO compensation and the emergence of venture capitalists exerted a more substantial influence on IPO underpricing than the winner's curse problem, which is related to information asymmetry.

Another information asymmetry theory suggests the presence of two types of investors during the IPO market: informed and uninformed. Informed investors have a better understanding of the issuing company's future cash flows and tend to participate in underpriced IPOs. In contrast, uninformed investors are more likely to engage in overpriced IPOs. This phenomenon is known as the winner's curse model (Rock, 1986).

The signalling theory proposes that firms underprice their IPOs to signal their superior quality and fundamental value to the stock market (Allen & Faulhaber, 1989; Welch, 1989). This strategy creates the perception among less-informed investors that investing in the company entering the stock exchange is a profitable opportunity, driving up demand for the shares and attracting more investors. Critics, however, argue that the theory oversimplifies the complexity of IPOs. The size of the IPO issuance also plays a role in explaining underpricing. Beatty and Ritter (1986) noted that smaller IPOs tend to exhibit larger underpricing. They attributed this phenomenon to investors' inclination to speculate more on smaller IPOs, which can lead to greater market efficiency in larger IPOs.

The composition of investors behind a company can further influence IPO underpricing. Studies by Megginson and Weiss (1991) and Brav and Gompers (1997) highlighted the impact of venture capitalists on IPO underpricing. IPOs backed by venture capitalists tend to exhibit lower levels of underpricing than those without venture capital support, as the presence of venture capitalists signals positively to retail investors, reducing the extent of underpricing (Megginson & Weiss, 1991; Brav & Gompers, 1997).

4 Financial Crises

Business cycle analysts typically define a recession as a period of economic downturn characterised by significant decreases in economic activity, extending beyond typical thresholds in terms of duration, depth, and breadth. According to Fiedler (1991), the "three Ds" – duration, depth, and diffusion – underscore the severity and scope of a recession. In practical terms, a recession entails a substantial contraction in economic output, impacting various sectors of the economy extensively and exhibiting a degree of persistence in its effects.

4.1 Global Financial Crisis and Eurozone Debt Crisis

The worldwide financial crisis, originating from the United States subprime mortgage market, had massive economic repercussions globally, with the eurozone economies no exception (Iversen et al., 2016, p. 178). Payment defaults on subprime credit products began to rise in the United States in August 2007, rapidly leading to losses in numerous European financial institutions as many of these loans had been bundled into complex credit risk products and sold throughout the global financial system (Kok et al., 2022, p. 9). Ehrmann et al. (2013) noted that the financial crisis significantly gauged the euro's existence and success even before its outbreak and the adoption of the common currency. Numerous banks became illiquid, some even insolvent, necessitating government intervention to prevent further contagion, resulting in increased public deficits and government bond spreads (Crum & Merlo, 2020). Later, in September 2008, with the collapse of Lehman Brothers, economic tensions escalated further, spreading worldwide and culminating in the global financial crisis, leading to a severe recession (Kok et al., 2022).

The Eurozone debt crisis can be traced back to the global financial crisis of 2008 (Carl, 2017). According to OECD data compiled by Iversen et al. (2016, p. 178), the entire Eurozone economy contracted by 4.5 per cent in 2009, adversely affecting the growth strategies of both northern and southern economies. It became a full-fledged sovereign debt

crisis in 2010 and 2011 as the recession deepened, particularly in Southern Europe. Amid the turmoil of the global financial crisis in 2009, it was revealed that Greece had manipulated its economic data for years, eroding investor confidence in the country's economy and leading to higher government bond yields, from which Greece struggled to recover (Rissanen, 2013).

Over the subsequent years, the Euro crisis became one of the most severe crises in the history of European integration, rivalled only by the Brexit referendum in 2016 on the United Kingdom's withdrawal from the European Union (later also the coronavirus pandemic), according to Frieden and Walter (2017). On the other hand, Roth (2022, p. 53) did not see Brexit as a significant threat to the future of the Eurozone because the UK had consistently rejected joining the euro from the outset, and the referendum was not a surprise but reflected the UK's long-standing scepticism toward the European project. Roth viewed Brexit as more connected to the European Union as a whole rather than specifically to the Eurozone.

According to Frieden and Walter (2017), the causes of the Euro crisis can be traced back to the political structures underlying European integration, particularly the process of constructing a common currency, which has several unresolved conflicts regarding its management. The Eurozone differs from other EU countries in its monetary and economic policies: monetary policy is the responsibility of an independent Eurosystem consisting of the ECB and the national central banks of Eurozone member states, while economic policy is primarily left to the member states' governments. However, these governments must coordinate their economic policies with each other to achieve joint stability, growth, and employment goals (European Commission, 2022). Frieden and Walter (2017) emphasised the difficulties in intergovernmental coordination and differing objectives among member states as the root causes of the problems.

The global financial crisis and the Eurozone sovereign debt crisis led to long-lasting economic disruptions, which prompted several financial system reforms, including the implementation of a unified rulebook (Basel III), the European Financial Supervision System (EFVJ), the Single Supervisory Mechanism (SSM), and the Single Resolution Board (SRB) (Kok et al., 2022). Roth (2022) believed that the popularity of the euro was facilitated by the ECB's decision to become the lender of last resort in the Eurozone government bond markets in 2012, which can be seen as one of the solutions to the sovereign debt crisis, in addition to the quantitative easing (QE) implemented from 2015 to 2018.

4.2 COVID-19 Pandemic in the Euro Area

The COVID-19 pandemic, which began in 2019, triggered massive shockwaves in the global economy, leading to the most significant worldwide economic crisis in over a century (World Bank, 2022). The coronavirus pandemic was a symmetric external shock affecting the entire world and the euro area. However, its effects were asymmetric across different countries and sectors due to varying economic structures (European Commission, 2021). The pandemic resulted in massive economic disruptions in production, trade, investments, employment, consumption, and financial systems (Kok et al., 2022).

In conventional recessions, as described by Ehnts and Paetz (2021), a particular dynamic continually evolves: the economy slows down, investments decrease, and unemployment rises, leading to a decline in incomes and consumer spending. During this process, the recession intensifies, but with successful monetary and fiscal policies, the economy eventually begins to recover. Improved expectations about the future boost investments, employment, production, and consumption. However, the COVID-19 crisis cannot be regarded as ordinary. According to the World Bank report (2022), unlike many previous crises, the outbreak of the pandemic was met with extensive and determined economic policy measures aimed at mitigating the pandemic's most severe human costs in the short term. Nevertheless, these measures did not negate the emergence of new risks,

such as increased private and public debt in the global economy, which could threaten recovery and lead to economic recession without intervention.

Ehnts and Paetz (2021) argue that the COVID-19 crisis exposed the shortcomings of the euro area, which should have been apparent after the global financial crisis. According to them, the euro area never fully recovered from the financial crisis, as evidenced by the nearly nonexistent growth in fixed capital formation (investments) since 2007. On the other hand, Kok et al. (2022) state that previous financial system reforms after the financial crisis have facilitated the implementation of common political crisis measures. An essential channel through which crises like the pandemic typically affect economic activity is how they alter expectations about future economic conditions (Ambrocio, 2022). Therefore, people's expectations and opinions about the currency may also change due to crises. While large-scale crisis measures were necessary and effective in mitigating the worst effects of the crisis, they led to a global increase in public debt, rekindling concerns about debt sustainability and widening disparities between developing and developed economies (World Bank, 2022).



Figure 2. Share price behaviour during the COVID-19 Crisis (Bank of Finland, 2021)

As seen in Figure 2, the global stock market response to COVID-19 was characterised by rapid and significant declines followed by a partial recovery. According to Liu et al. (2021),

the pandemic triggered widespread uncertainty and panic among investors, leading to sharp selloffs across major indices worldwide. However, government intervention and monetary stimulus measures helped stabilise markets somewhat, with certain sectors such as technology and healthcare experiencing notable gains. Overall, the COVID-19 pandemic highlighted the vulnerability of global financial markets to external shocks and underscored the importance of policy responses in mitigating market volatility (Hoekstra et al., 2020).

5 Data and Methodology

5.1 Data Description

The dataset comprises 29 IPO companies that underwent public listing amidst the observed financial crises and remain actively traded in the public stock market. Additionally, 60 IPOs that were executed in normal times will be used as reference. This thesis leverages a comprehensive dataset encompassing all Initial Public Offerings in Finland from 2000 to 2023. The dataset is curated based on a distinctive temporal criterion, classifying companies into two groups. A 'Crisis Group' consisting of companies that underwent IPOs during the 2007-2008 financial crisis or a year after that, as well as those during the 2020 COVID-19 crisis or a year after that, and a 'Normal Group' comprising companies that executed IPOs at times other than the specified crises and at least three years before any financial crisis. The dataset has been meticulously compiled with data obtained from reputable databases under the guidance and access provided by a university professor. The focus on the temporal dimension and specific crisis periods ensures a nuanced exploration of the impact of financial crises on IPOs. The dataset spans from 2000 to 2023, capturing IPOs across a broad temporal range. Focusing on specific crisis periods and including a 'Normal Group' ensures a comprehensive analysis of IPO performance in various economic contexts.

As mentioned, the dataset is stratified into two distinct groups based on the temporal and crisis-related criteria: a. Crisis Group: Companies undergoing IPOs during the 2007-2008 financial crisis or a year after that, as well as those during the 2020 COVID-19 crisis or a year after that. b. Normal Group: Companies undergoing IPOs at times other than the specified crises and at least three years before any financial crisis.

IPOs in OMX Helsinki 2000-2023	Completed	Chosen Sample
Observations	146	89

Table 1. IPOs in OMX Helsinki during 2000-2023

After screening the data, it was necessary to limit the number of IPOs to fit the chosen criteria of times when they were listed. 89 IPOs were selected mainly based on two factors. First, the listing time had to either be during the financial or COVID-19 crisis. If so, it was chosen to be in the situation- group. Secondly, if the IPO was not executed during those times, it needed to have at least one year after the listing time before a financial crisis started. This way, it was ensured that the one-year observation period was not affected by abnormal times and could still be considered a regular economic state.

A filtering process was implemented in Excel to isolate IPO observations from the sample dataset. This process involved creating filters based on relevant criteria, such as the event date or specific keywords indicating IPO events. Applying these filters retained only observations corresponding to IPO events for further analysis. Subsequently, the IPO observations were categorised into two distinct periods: financial crisis times and regular times. This categorisation allowed for a comparative analysis of IPO performance during different economic conditions.

IPOs in OMX Helsinki 2000-2023	Regular times	Financial Crisis
Observations	60	29

Table 2. IPOs in OMX Helsinki during normal economic times and financial crises

The sample data of 89 observations was categorised into two distinct periods: 29 observations from financial crisis times and 60 observations from regular times. The selection process involved rigorous analysis conducted using Microsoft Excel, which was the primary tool for organising and analysing the data.

Period	Number of Observations
Pre-2007-2008 Financial Crisis	17
2007-2008 Financial Crisis	6
2010-2019	38
COVID-19 Crisis	24
Post COVID-19 Crisis	4
Total	89

Table 3. Finnish IPOs based on year of execution and the economic environment

The data from the pre-2007-2008 Financial Crisis encompasses a total of 17 IPO observations, capturing the IPO activities preceding the onset of the global financial downturn. Followed by the IPOs during the 2007-2008 Financial Crisis. Amidst the financial turmoil witnessed during the 2007-2008 financial crisis, the dataset reflects a modest count of 6 IPO observations, indicative of the challenging economic circumstances prevailing during this period. A substantial portion of the dataset, comprising 38 observations, pertains to the decade spanning from 2010 to 2019. This denotes a phase characterised by economic convalescence and expansion after the financial crisis, thereby witnessing heightened IPO activities and market buoyancy. The next dataset encompasses 24 IPO observations corresponding to the period coinciding with the COVID-19 crisis, emblematic of the profound impact of the pandemic on financial markets and IPO endeavours. Following the tumultuous period of the COVID-19 crisis, a modest count of 4 IPO observations is recorded, signifying the nascent stage of recovery and market recalibration post-pandemic.

The thorough examination of IPO observations across different periods provides valuable insights into how IPO activities change over time and are influenced by the surround-

ing circumstances. By analysing these patterns, we can better understand how IPO markets respond to economic changes. This understanding helps us make more informed decisions and develop methods to examine the underpricing of IPOs during different times.

Before conducting any statistical analysis, it is important to observe the returns of the IPOs during different times and compare them with each other. The typical one-day return for initial public offerings (IPOs) is 2.88% during regular business hours, suggesting a slight initial price increase soon after listing. On the other hand, IPOs during crisis times yield significantly greater 1-day returns—averaging 15.54%. This points to a high degree of investor fervour or market optimism over initial public offerings (IPOs) during times of crisis, which may be fueled by hopes for future expansion or the requirement for money injection during hazy economic times. IPOs at regular periods show a further return increase throughout the first week of trading, averaging 5.71%. This shows that there has been consistent positive momentum and investor interest after the initial listing. Like this, initial public offerings (IPOs) during times of crisis maintain their excellent performance over the first week, averaging a 7-day return of 16.57%.

The greater returns as compared to average times imply that the favourable market dynamics and emotions that encourage initial public offerings (IPOs) during times of crisis go beyond the first listing day. Interestingly, during normal and crisis times, IPO success varies considerably over the long run. IPOs perform fairly consistently during regular times, averaging a 4.48% return over 365 days. On the other hand, the long-term performance of initial public offerings (IPOs) launched during crisis periods significantly declines, with an average return of just 1.87% over the same period. This implies that the early investor excitement or market optimism surrounding crisis-time initial public offerings (IPOs) might not translate into long-term sustained success, possibly due to underlying market concerns or underlying economic issues that continue past the immediate crisis period. The analysis, taken as a whole, emphasises the different patterns in IPO returns seen in both normal and crisis situations. In contrast to initial public offerings

(IPOs) conducted during times of market stability, those conducted during crises sometimes yield noticeably larger short-term gains. However, their long-term performance may be less stable. These results highlight the significance of considering the overall market and economic environment when analysing IPO investment prospects and determining their long-term viability and associated risks.

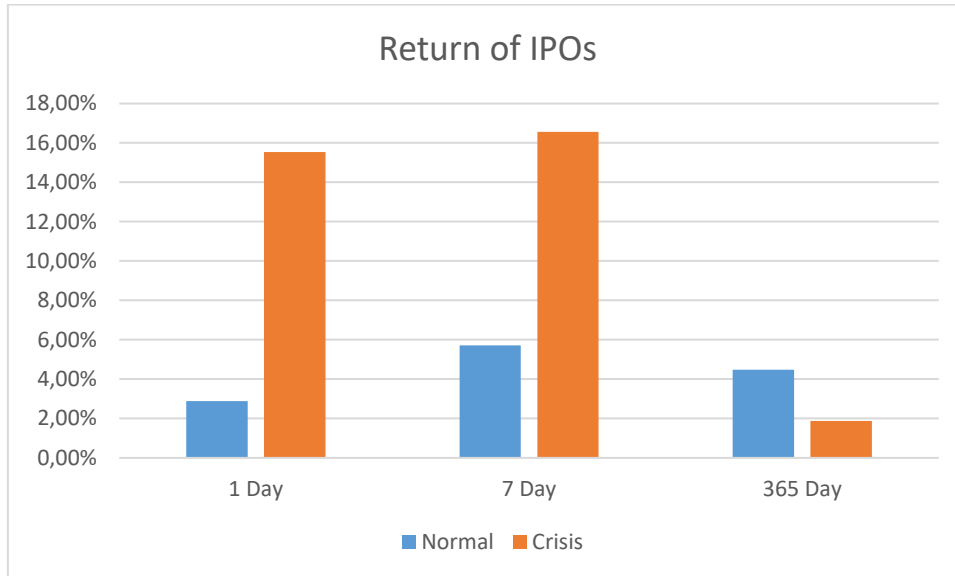


Figure 3. Average returns of IPOs 1, 7 and 365 days after the listing day

5.2 Methodology

The returns of companies undergoing an Initial Public Offering (IPO) were subject to examination through an event study. This event study was conducted on the date of the IPO, scrutinising both short-term and long-term returns following the deal announcement across three distinct observation periods. Specifically, one day after the IPO, 1-day post-announcement, 1-week post-announcement and 1-year post-announcement days served as the designated observation periods.

5.3 Methodological Constraints

While examining the methodology concerning the topic, it becomes evident that the event study employs several limitations, primarily associated with its construction. Event

studies typically involve three distinct windows: 1) an estimation window, 2) an event window, and 3) a post-event window. However, utilising the initial trading day of the IPO as the event day poses challenges due to the absence of price data before the event, rendering a conventional estimation window impractical.

To address this predicament, various approaches can be considered. The literature on event studies presents two main strategies to tackle this issue: the matched firm approach (MF) and the portfolio matching approach (PM) (Smith, 2009). Smith (2009) further categorises these approaches into seven subgroups: a) Market Capitalization (MF), b) Industry (MF), c) Industry & Market Capitalization (MF), d) Market Capitalization and Book-to-Market Ratios (MF), e) Market Capitalization (PM), f) Industry Affiliation (PM), and g) Market Capitalization and Book-to-Market Ratios (PM). Smith's findings indicate that the portfolio matching strategy yields unsatisfactory test statistics, while the matched firm approach demonstrates robust results.

The determination of industry affiliation, based on the standard industrial classification (SIC), could have been replicated for Finnish companies using their respective Swedish business classification code. Additionally, obtaining and comparing book-to-market ratios for each company according to their code, alongside market capitalisation and book value, would have been necessary to calculate a beta and an alpha proxy before the IPO for each company. However, the extensive scope of Smith's methodology, while comprehensive, would have been too time-consuming for the purposes of this thesis, diverting attention from its intended focus.

Instead of Smith's approaches, the methodology chosen to address the lack of an estimation window was inspired by Saro & Chenine (2007), setting alpha equal to 0 and beta equal to 1. While this approach simplifies the calculation, different companies would have acquired distinct betas and alphas. Nevertheless, the diversity within our sample of 89 companies, varying in size and sector, suggests that those with higher betas may balance companies with lower betas.

5.4 Market-adjusted model

The market model is widely utilised in calculating the returns for any given security. However, MacKinlay (1997) suggests using the market-adjusted model instead, particularly when dealing with limited data and the unavailability of pre-event data. The market-adjusted model is essentially a constrained version of the market model, where the coefficients are predetermined, eliminating the need for parameter estimates.

MacKinlay advises caution in employing the market-adjusted model due to its inherent restrictions, which can introduce biases in the results. Nonetheless, in scenarios where obtaining pre-event market data is unfeasible, such as when analysing the initial returns of a new offering, the market-adjusted model proves to be the most suitable approach. For instance, Ritter (1991) employed this model to assess the underpricing of IPOs.

Similarly, Campbell et al. (1998) corroborate MacKinlay's stance, emphasising the utility of the market-adjusted model in situations with limited data availability. They echo the caution against indiscriminate use, advocating for its application only when necessary to mitigate potential biases. Despite these limitations, the market-adjusted model remains a popular choice, especially in the context of IPO underpricing analysis.

The market-adjusted model, being a constrained version of the market model, necessitates understanding the latter first. The market model assumes that the returns follow a single factor. The returns are calculated as follows:

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it} \quad (1)$$

In this equation, R_{it} represents the return of stock i during period t , while R_{mt} stands for the market return or benchmark in the same period. ϵ_{it} denotes the zero mean dis-

turbance term, reflecting any unexplained variability in the stock's return. The parameters α_i and β_i are specific to the market model and describe the relationship between the stocks and market returns. Abnormal returns (ARs) are derived from this formula by calculating the difference between the actual return of the stock and its expected return based on the market model:

$$AR_{it} = R_{it} - (\alpha_i + \beta_i R_{mt}) \quad (2)$$

As mentioned before, there are some evident limitations with the chosen methodology. With no pre-event data available, setting alpha equal to zero and beta equal to one is necessary. In the market-adjusted model, the abnormal returns are calculated as follows:

$$AR_{it} = R_{it} - R_{mt} \quad (3)$$

After obtaining the abnormal returns for each stock at a particular time, the subsequent step involves computing each stock's cumulative abnormal returns (CARs). This is done by summing up the abnormal returns across consecutive days. The formula for calculating cumulative abnormal returns is as follows:

$$CAR(t_1, t_2) = \sum_{t=t_1}^{t_2} AR_{it} \quad (4)$$

After computing the CARs for each stock, the next logical step is to ascertain the cumulative average abnormal returns (CAARs) for every stock during the event period. CAAR signifies the average returns of the dataset, considering the number of observations (represented by n) during the event period. CAARs are calculated using the following formula:

$$CAAR = \frac{1}{2} \sum_{i=1}^n CAR(t_1, t_2) \quad (5)$$

The final step involves testing the statistical significance of the results, which typically entails utilising both parametric and nonparametric tests. A parametric test in the form of a t-test will be conducted to assess the significance of the results.

Next, the paper will go through the reasons behind the selection of OMX Helsinki 25 as a benchmark index for evaluating initial public offerings (IPOs) in the Finnish market. Focusing on the importance of data consistency and comparability, the discussion highlights how the choice of OMX Helsinki 25 eliminates market variations and facilitates a more accurate assessment of IPO performance. The OMX Helsinki 25 index used in the study consists of the 25 most traded stocks on the Helsinki Stock Exchange, each with an individual weight limited to 10 per cent. Additionally, the stocks included in the index and their weights are reviewed every six months (Jach et al., 2019).

By maintaining a homogeneous dataset comprising listings exclusively from Finland, this methodological approach enhances the reliability and validity of research outcomes in IPO analysis. Maintaining consistency in data analysis is paramount to derive meaningful insights and draw accurate conclusions. By selecting OMX Helsinki 25 as the benchmark index, all IPOs included in the analysis originate from the Finnish market, thereby eliminating cross-market variations and ensuring uniformity in data representation. The Finnish market presents unique characteristics and economic dynamics that may influence IPO performance. By restricting the benchmark index to OMX Helsinki 25, which comprises listings exclusively from Finland, this approach captures the inherent market conditions and nuances specific to the Finnish economy, thus providing a more accurate reflection of IPO performance. Comparing IPO performance against a benchmark index composed of listings from the same market enhances the relevance and applicability of research findings. OMX Helsinki 25 is an appropriate reference point for evaluating IPOs in Finland, allowing for a comparative analysis that considers local market dynamics and

investor sentiment. All data regarding the OMX Helsinki 25 was acquired from Yahoo Finance, which allows researchers to specify the time frame of interest, ranging from daily to yearly intervals, enabling the extraction of comprehensive historical datasets.

6 Results and Discussion

This chapter provides the outcomes of the calculations that were conducted, along with a discussion of the significant findings. Further discussion will be presented also in the following chapter. The primary objective of the analysis is to evaluate and compare the initial performance and the performance after one week and one year following the Initial Public Offerings (IPOs) on OMX Helsinki during financial Crises and compare them to IPOs executed during regular times. The period used is from the year 2000 to the end of year 2023. The methodology involves calculating abnormal returns using the market-adjusted model outlined in the preceding chapter. Cumulative abnormal returns (CARs) are computed for both types of IPOs within their first day of trading on the stock market as well as after seven days and 365 days after going public. The analysis was conducted on each time window for both IPOs that took place regularly and during financial crises. The section presents CARs for each sub-data sample, descriptive statistics, and parametric t-test values for all six datasets.

The abnormal returns are calculated from a sample of 89 IPOs that took place during either the 2007-2008 financial crisis or during the COVID-19 crisis in 2020-2021, as well as in times that can be considered normal. The cumulative abnormal returns (CARs) are determined utilising the market-adjusted market model.

IPO CARs	
Observations	29
Mean	15,62 %
Median	12,92 %
Maximum	81,80 %
Minimum	-29,92 %
Standard Deviation	0,24
Skewness	0,79
Kurtosis	1,07
T-stat	0,00
Jarque-Bera	4,43
Count of Negative	7
Count of Positive	22

Table 4. Descriptive statistics of IPOs listed during financial crises after one day

IPO CARs	
Observations	29
Mean	16,43 %
Median	17,50 %
Maximum	83,21 %
Minimum	-24,45 %
Standard Deviation	0,25
Skewness	0,85
Kurtosis	0,88
T-stat	0,00
Jarque-Bera	4,45
Count of Negative	9
Count of Positive	20

Table 5. Descriptive statistics of IPOs listed during financial crises after one week

IPO CARs	
Observations	29
Mean	2,63 %
Median	-23,23 %
Maximum	309,21 %
Minimum	-78,83 %
Standard Deviation	0,76
Skewness	2,89
Kurtosis	9,40
T-stat	0,87
Jarque-Bera	147,05
Count of Negative	17
Count of Positive	12

Table 6. Descriptive statistics of IPOs listed during financial crises after one year

6.1 IPOs during normal times

IPO CARs	
Observations	60
Mean	3,02 %
Median	1,87 %
Maximum	110,49 %
Minimum	-43,61 %
Standard Deviation	0,20
Skewness	2,19
Kurtosis	13,52
T-stat	0,25
Jarque-Bera	504,77
Count of Negative	24
Count of Positive	36

Table 7. Descriptive statistics of IPOs listed during normal times after one day

IPO CARs	
Observations	60
Mean	5,94 %
Median	2,65 %
Maximum	319,49 %
Minimum	-76,45 %
Standard Deviation	0,45
Skewness	5,65
Kurtosis	40,24
T-stat	0,31
Jarque-Bera	4366,53
Count of Negative	24
Count of Positive	36

Table 8. Descriptive statistics of IPOs listed during normal times after one week

IPO CARs	
Observations	60
Mean	-6,07 %
Median	-10,34 %
Maximum	169,81 %
Minimum	-95,46 %
Standard Deviation	0,52
Skewness	0,75
Kurtosis	1,17
T-stat	0,40
Jarque-Bera	9,00
Count of Negative	37
Count of Positive	23

Table 9. Descriptive statistics of IPOs listed during normal times after one year

This chapter comprehensively analyses Cumulative Abnormal Returns (CARs) observed in Initial Public Offerings (IPOs) over a specified event window. The analysis aims to provide insights into the performance of IPOs listed on OMX Helsinki during normal financial

times after one day. The average CAR across all IPOs is found to be 3.02%, with a median of 1.87%. This indicates that while the mean CAR is slightly higher, the median CAR is more representative of the central tendency of the data. The maximum observed CAR is 110.49%, signifying instances of significant positive impact, whereas the minimum CAR is -43.61%, indicating substantial negative effects in certain cases. The standard deviation of CARs is 0.20, suggesting moderate variability around the mean. Skewness is positive at 2.19, indicating a right-skewed distribution with a tail extending towards higher values. Moreover, a high kurtosis value of 13.52 suggests heavy tails and increased peakedness compared to a normal distribution. The p-value of the t-test 0.25 suggests that the mean CAR is not significantly different from zero. Additionally, the high Jarque-Bera value of 504.77 indicates a significant deviation from normality. Of the 60 observations, 24 have negative CARs, while 36 have positive CARs, demonstrating a mixed impact of IPO events. While some IPOs experience considerable positive returns, others face substantial negative returns during the event window.

The results differ notably when analysing the results after one day for the IPOs done during financial crises. The statistical analysis reveals key insights into the performance of IPOs within the event window. The mean CAR stands at 15.62%, indicating a positive average market reaction to IPOs. The median CAR, at 12.92%, suggests a robust performance across the sample. The range of CARs spans from a minimum of -29.92% to a maximum of 81.80%, highlighting significant variability in IPO performance. The standard deviation of CARs is 0.24, indicating moderate variability around the mean. A positive skewness of 0.79 suggests a slight right-skewed distribution, with more observations clustered towards lower returns. The kurtosis value of 1.07 implies a distribution closer to normality compared to heavier-tailed distributions. The low p-value of the t-statistic of 0.001 indicates that the mean CAR is significantly different from zero. Furthermore, the Jarque-Bera statistic of 4.43 suggests no significant deviation from normality, affirming confidence in the distributional assumptions. The findings provide valuable insights for investors, signalling an overall positive market response to IPO events within the ex-

amined timeframe. As discussed earlier, one of the primary reasons for IPO undervaluation during financial crises is the heightened market uncertainty and investor risk aversion. Uncertain economic conditions and volatile market sentiment lead investors to adopt a more conservative stance, reducing their willingness to invest in new offerings. Consequently, the demand for IPOs diminishes, exerting downward pressure on their valuations (Ritter, 1991).

The results are as follows for the next timeframe, one week after the IPOs during normal times. The dataset comprises 60 observations of IPO CARs, providing a comprehensive performance overview. The mean CAR is calculated at 5.94%, indicating the average abnormal return generated by IPOs during the observation period. The median CAR, at 2.65%, represents the middle value of the dataset, providing insights into the central tendency of IPO performance. The range of CARs is substantial, with the maximum recorded at an impressive 319.49% and the minimum at -76.45%. This wide dispersion underscores the variability in IPO performance, with some offerings experiencing significant gains while others incur substantial losses. The standard deviation, a measure of dispersion around the mean, is calculated at 0.45%, indicating the extent of variability in CARs. The skewness of CARs is notably positive, recorded at 5.65. This positive skewness suggests that the distribution of CARs is skewed towards higher values, indicating a prevalence of positive abnormal returns in the dataset. Additionally, the kurtosis is substantially high at 40.24, indicating a high degree of peakedness and fat tails in the distribution, suggesting significant outliers in CARs. The p-value of the T-statistic, at 0.31, provides insights into the significance of the mean CAR relative to zero. The low T-statistic suggests that the mean CAR is not statistically different from zero, indicating that IPO performance, on average, may not deviate significantly from the market benchmark. Furthermore, the Jarque-Bera statistic, calculated at 4366.53, indicates a departure from normality in the distribution of CARs.

During financial crises, the results after seven days are significantly different. The mean CAR is computed at 16.43%, indicating the average abnormal return generated by IPOs

during the observation period. Additionally, the median CAR stands at 17.50%, representing the middle value of the dataset and offering insights into the central tendency of IPO performance. IPO CARs exhibit a wide range of values, with the maximum reaching 83.21% and the minimum recorded at -24.45%. This substantial dispersion underscores the volatility and variability in IPO performance, with some offerings experiencing significant gains while others suffer losses. The standard deviation, calculated at 0.25%, reflects the extent of variability in CARs around the mean. The skewness of IPO CARs is positive, measured at 0.85. This positive skewness indicates that the distribution of CARs is skewed towards higher values, suggesting a prevalence of positive abnormal returns in the dataset. Moreover, the kurtosis is relatively low at 0.88, indicating a moderate degree of peakedness in the distribution, with fewer outliers compared to distributions with higher kurtosis values. The p-value of the T-statistic, computed at 0.001, suggests that the mean CAR is statistically significant, indicating that IPO performance, on average, may not deviate significantly from the market benchmark within the specified period. Furthermore, the Jarque-Bera statistic, calculated at 4.45, indicates a departure from normality in the distribution of CARs, albeit to a lesser extent compared to distributions with higher Jarque-Bera values. Among the 29 observations, nine instances exhibit negative CARs, while 20 instances demonstrate positive CARs. This distribution underscores the clear results of how IPOs during financial crises are still underpriced compared to regular times.

The results for the IPOs executed during normal times and financial crises both have relatively high, thus insignificant, p-values of 0,4 and 0,87, respectively. In the first dataset, IPO CARs demonstrate considerable dispersion, with a maximum of 169.81% and a minimum of -95.46%. Conversely, the second dataset showcases a wider range of CARs, with a maximum of 309.21% and a minimum of -78.83%. The standard deviation for the first dataset is 0.52, while for the second dataset, it is notably higher at 0.76, indicating greater variability in CARs. The skewness of IPO CARs in the first data set is positive, indicating a distribution skewed towards higher values, with a skewness value of 0.75. In comparison, the second dataset exhibits higher positive skewness at 2.89, suggesting a

more pronounced skewness towards positive returns. Additionally, both datasets display positive kurtosis values, albeit to varying degrees, signifying peakedness in the distribution of CARs. The Jarque-Bera statistic, which tests for normality, is substantially higher for the second dataset (147.05) compared to the first dataset (9.00), indicating a departure from normality in the distribution of CARs. The first dataset comprises 37 instances of negative CARs and 23 instances of positive CARs, indicating a prevalence of negative returns. In contrast, the second dataset exhibits 17 instances of negative CARs and 12 instances of positive CARs, further highlighting the differences in performance outcomes between the two observation periods.

Analysis indicates that during financial crises, IPOs tend to be underpriced. This is supported by the higher mean cumulative abnormal return (CAR) of 15.62% for IPOs during crises compared to 3.02% for IPOs in normal times, suggesting a more positive market response to crisis-period IPOs. The statistical analysis also shows that the mean CAR is significantly different from zero during financial crises, indicating a substantial market reaction to these IPOs. The analysis supports H1, indicating that underpricing of IPOs occurs more often during financial crises. IPOs during these periods tend to experience a more positive market response in terms of initial underpricing. After one day of trading, the average CAR for IPOs during financial crises was 15.62%, suggesting a positive market reaction. After one week, the average CAR for crisis-period IPOs was 16.43%, again indicating a positive market response. After one year, the study shows negative abnormal returns for IPOs executed during both regular times and financial crises, with a more pronounced negative return for crisis-period IPOs. These findings support existing literature. Ljungqvist (2007) explains that behavioural theories posit the existence of 'irrational' investors who drive up the prices of IPO shares beyond their intrinsic value. While IPOs may experience initial excitement and overvaluation, long-term performance often reflects a correction to more realistic levels (Ljungqvist, 2007). These results support existing literature. According to Baig & Chen (2022), IPOs during COVID-19 were notably underpriced due to having faced increased levels of information uncertainty compared to those before the pandemic. Additionally, results from Sweden and Norway are similar

and show how the pandemic impacted the IPO market (Aronsveen et al., 2022). The analysis also supports H2. While IPOs during financial crises did not underperform the market in the short term, they did exhibit negative abnormal returns in the long term, particularly after one year. This suggests that while crisis-period IPOs initially have a positive market response, they may face challenges in sustaining performance over the long term.

Earlier in the thesis, figure 4 illustrates the average returns of IPOs. This figure provided an overview of the typical performance of IPOs within the studied observation periods. However, Figure 4 presents a different perspective by showing the abnormal returns of the same IPOs after conducting a comprehensive analysis and market adjustment.

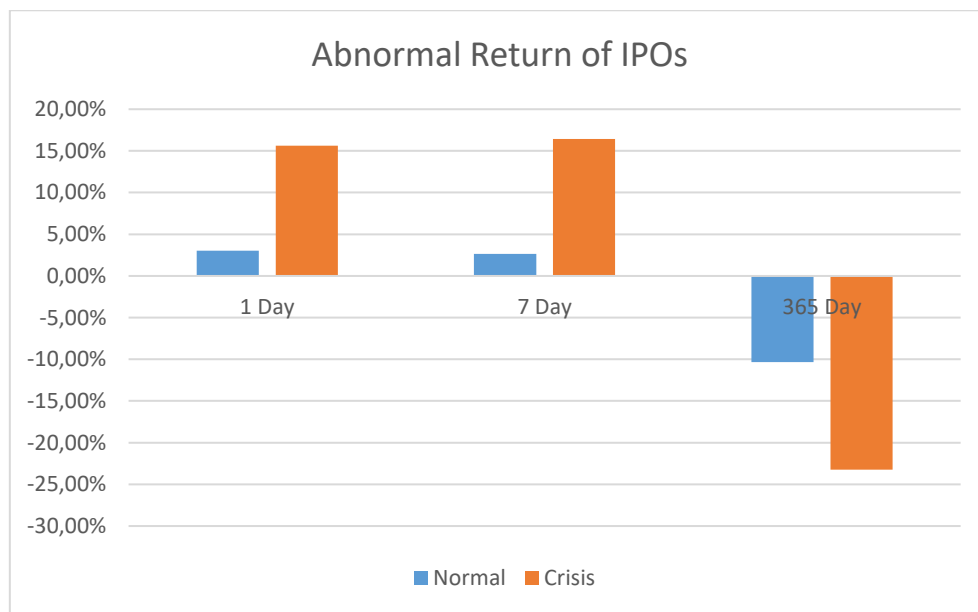


Figure 4. Average abnormal returns of IPOs 1, 7 and 365 days after the listing day

The results depicted in Figure 4 reveal a significant shift in abnormal returns compared to the average returns previously illustrated. Notably, after 365 days, the abnormal returns are negative. This contrasting finding suggests that the performance of IPOs, when

adjusted for market conditions and other relevant factors, differs from what might be expected based solely on average returns.

The negative abnormal returns observed after 365 days could be attributed to the overall positive performance of the market during this period. Despite the initial underpricing of IPOs, which typically leads to positive abnormal returns in the short term, the market's strong performance post-financial crisis has resulted in negative abnormal returns over the longer term. This observation highlights the significance of considering market conditions and adjusting for relevant factors when analysing IPO performance. Moreover, the negative abnormal returns can be interpreted in the context of the significant rebound effect often observed after a financial crisis. As the market recovers from a downturn, stock price uptick tends to occur, leading to negative abnormal returns for IPOs. This rebound effect is considered in the analysis, as the results are market-adjusted to provide a more accurate assessment of IPO performance relative to broader market trends. One reason explaining these negative results could be that interest in IPO companies typically eases after one year, possibly indicating that IPOs might have been overpriced initially. According to Chahine et al. (2013), one reason explaining these negative results could be that interest in IPO companies typically eases after one year, possibly indicating that IPOs might have been overpriced initially.

Figure 5 presents the market return over different time horizons, comparing periods of normal market conditions with those of financial crises. The findings indicate a nuanced pattern of market performance across these timeframes.

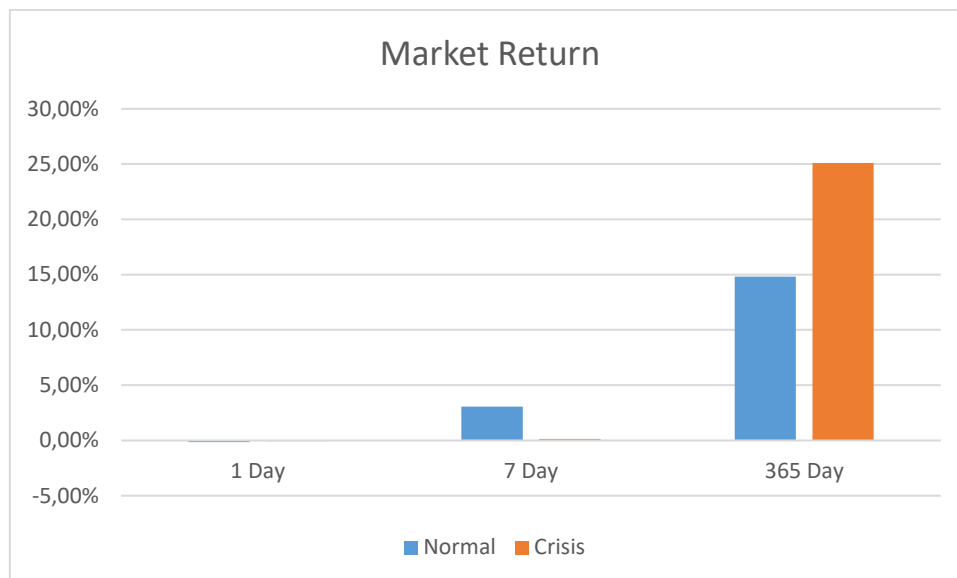


Figure 5. Average market returns 1, 7 and 365 days after the listing of observed IPOs

Initially, the market return is observed to be slightly negative after one day, reflecting a modest downturn in market sentiment immediately following the IPOs. However, this negative trend is short-lived, as the market shows a slight positive return after seven days. This indicates a rapid recovery and suggests that any initial market pessimism is quickly overcome. Remarkably, the market return becomes notably positive after 365 days, regardless of whether the IPOs were conducted during normal market conditions or financial crises. This observation underscores the market's resilience over the long term, demonstrating a robust rebound effect following both normal market conditions and financial crises. The consistent positive market return after 365 days suggests that investors regain confidence and optimism in the market's prospects over time. This phenomenon aligns with broader economic recovery trends observed after financial turmoil, highlighting the market's ability to adapt and thrive despite short-term fluctuations (Acharya, 2009).

7 Conclusion

When observing the pricing of IPOs and their long-term performance, it is evident that the financial environment plays a notable role in the equation. Based on the findings presented in the comparative analysis of IPO Cumulative Abnormal Returns (CARs), it is evident that IPOs executed during financial crises tend to exhibit characteristics indicative of underpricing, particularly when measured over a short timeframe. The analysis revealed notable differences in IPO performance between observation periods, with IPOs conducted during financial crises demonstrating a tendency towards negative median CARs and lower mean CARs compared to IPOs executed under more stable market conditions.

The negative median CARs observed across both datasets suggest that IPOs during financial crises often experience initial underpricing, where the market value of newly issued shares tends to exceed the offer price. This phenomenon is further supported by the prevalence of negative CARs and the skewness towards negative returns, particularly evident in the dataset comprising observations during financial crises.

The dispersion and extremes observed in IPO CARs during financial crises underscore such periods' heightened volatility and uncertainty. The wider range of CARs and higher standard deviation indicate greater variability in IPO performance, reflecting the challenges and risks associated with pricing and valuing new securities amid market turmoil.

Statistical tests conducted on the datasets revealed significant deviations from normality in the distribution of IPO CARs during financial crises, as evidenced by higher Jarque-Bera statistics. This departure from normality suggests non-random patterns in IPO performance, potentially driven by market sentiment, investor behaviour, and economic conditions prevailing during financial crises.

The findings corroborate existing literature on IPO underpricing, highlighting the tendency for IPOs to be undervalued in the short term, particularly when issued during periods of financial distress. This underpricing phenomenon may be attributed to various factors, including asymmetric information, investor risk aversion, and market sentiment influenced by prevailing economic conditions.

In conclusion, the comparative analysis provides empirical evidence that IPOs are indeed underpriced when measured over a short timeframe, especially during financial crises. The insights gleaned from this study underscore the importance of considering market context and economic conditions when evaluating IPO performance and investment decisions, offering valuable implications for investors, issuers, and policymakers alike.

The results support H1, indicating that IPOs tend to be underpriced more frequently during financial crises than periods of economic stability. This is evidenced by the higher average returns observed for IPOs launched during financial crises over both short-term (1 and 7 days) and long-term horizons, suggesting that investors may be more willing to bid up the prices of IPOs amid heightened market uncertainties and risk aversion during crisis periods. The increased underpricing of IPOs during financial crises aligns with the notion that market conditions characterised by heightened volatility and risk can lead to more conservative pricing strategies by issuers and greater investor demand for IPO shares, resulting in higher initial returns for investors.

While the results indicate that IPOs launched during financial crises offer better short-term returns than IPOs launched during more stable market conditions, the long-term performance of crisis IPOs is comparatively poorer. Despite the initial underpricing and higher short-term returns observed for crisis IPOs, the analysis suggests that these investments may not translate into sustained performance over the long term. This aligns with H2, posing that IPOs may be poor long-term investments during financial crises. The lower long-term returns observed for crisis IPOs could be attributed to various factors, including the lingering effects of economic downturns on company fundamentals,

heightened market uncertainties impacting investor sentiment, and the inability of crisis IPOs to sustain the initial market optimism or investor enthusiasm beyond the immediate crisis period.

Moreover, the absence of dividend data, attributed to their intricate nature, presents another challenge. This gap notably undermines the long-term performance analysis of the IPOs. While it is plausible to speculate that including dividends could have potentially improved the long-term performance metrics, such assumptions remain speculative. Nonetheless, the lack of dividend data should not substantially alter the disparities observed among different groups' results.

In conclusion, the findings provide empirical support for both hypotheses, highlighting the nuanced relationship between financial crises, IPO underpricing, and long-term investment performance. While IPOs during financial crises may offer attractive short-term returns due to increased underpricing and investor demand, investors should exercise caution and consider the potential risks and uncertainties associated with these investments over the long term. In the long term, IPOs executed during a financial crisis tend to underperform the market. This suggests that the returns generated by these IPOs over an extended period following the crisis are typically lower than the overall market returns. It is worth noting that this analysis does not account for dividends, which can further impact the overall returns on investment.

7.1 Further research

Even though the study's conclusions provide insightful information about the underpricing of initial public offerings during financial crises, more research is necessary to confirm and extend these conclusions, especially considering the study's sample size and geographic restrictions. It is important to approach the findings of this study with a critical eye, given its inherent limitations. Primarily, the study's sample size is relatively small, comprising only 89 IPOs. This constraint is largely due to the limited number of IPOs

available in the Finnish market, stemming from its small scale. Consequently, this narrow sample size may hinder the regressions' robustness and explanatory power. Fortunately, the recent surge in listings has bolstered the number of IPOs in recent years, thereby enhancing both the quality and quantity of samples for future research endeavours. This chapter looks at possible directions for future study, emphasising ways to improve our knowledge of IPO performance in various market environments and geographical locations. One promising direction for future research is to examine IPO performance in Scandinavian countries, which have distinctive market characteristics and regulatory frameworks compared to other regions. By analysing IPO data from markets such as Sweden, Norway and Denmark, researchers can gain insights into how factors such as governance practices, investor behaviour, and market dynamics influence IPO pricing and performance in Northern Europe. Additionally, this would eliminate the problem that this study faced due to a small sample size.

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