Strategies on initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

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Strategies on initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

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Abstract – This research considers the strategies on the initial public offering of company equity at the stock exchanges in the imperfect highly volatile global capital markets with the nonlinearities. We provide the IPO definition and compare the initial listing requirements on the various markets. We analyze the IPO techniques: the fixed-price offerings, auctions, book-building. We focus on the IPO initial underpricing, long-run performance and after market liquidity problems. 1. We propose that the information absorption by the investors occurs in the evolving learning process about the company’s value, taking to the consideration the fundamental purpose of investing and the responsibilities of investors. 2. We think that the information absorption capacity by the investors on the IPOs impacts the investor’s investment decisions and serves as a pre-determinant for the successful IPO deal completion. We propose the Ledenyov theory on the origins of the IPO underpricing and long term underperformance effects, which states that the IPO underpricing and long term underperformance can be explained by the changing information absorption capacity by the investors on the IPO value. 3. We think that the IPO winning virtuous investment strategies can only be selected by the investors with the highest information absorption capacity through the decision making process on the IPO investment choices at the selected stock exchange in the imperfect highly volatile global capital markets with the nonlinearities; applying the econophysical econometrical analysis with the use of the inductive, deductive and abductive logics in the frames of the strategic choice structuring process, that is the winning through the distinctive choices process.

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Introduction

Let us begin with the definition of the Initial Public Offering (IPO) as one of the business transformation processes, described in the contemporary academic literature.

Wikipedia (2014) provides the following IPO definition: “An initial public offering (IPO) or stock market launch is a type of public offering where shares of stock in a company are sold to the general public, on a securities exchange, for the first time. Through this process, a private company transforms into a public company. Initial public offerings are used by companies to raise expansion capital, to possibly monetize the investments of early private investors, and to become publicly traded enterprises. A company selling shares is never required to repay the capital to its public investors. After the IPO, when shares trade freely in the open market, money passes between public investors. Although an IPO offers many advantages, there are also significant disadvantages, chief among these are the costs associated with the process and the requirement to disclose certain information that could prove helpful to competitors, or create difficulties with vendors.

Details of the proposed offering are disclosed to potential purchasers in the form of a lengthy document known as a prospectus. Most companies undertake an IPO with the assistance of an investment banking firm acting in the capacity of an underwriter. Underwriters provide several services, including help with correctly assessing the value of shares (share price), and establishing a public market for shares (initial sale). Alternative methods such as the Dutch auction have also been explored. In terms of size and public participation, the most notable example of this method is the Google IPO. China has recently emerged as a major IPO market, with several of the largest IPOs taking place in that country.”

Chang-Yi Hsu, Jean Yu, Shiow-Ying Wen (2013) explain: “Initial public offering (IPO) is one of the popular methods which corporation uses to finance their equity. IPOs can be either small or large companies to raise expansion capital and become publicly traded enterprises. Numerous studies provide that common stocks of IPOs usually get high abnormal returns during the initial period, and then underperform during the post-issue period. There is no behavioral theory to explain why investors would react so. Investors’ behavior is difficult to be predicted and measured directly.”

Boeh, Southam (2011) notice: “The IPO is a key milestone that facilitates access to the public capital market and provides investors with a liquid security with an established market price. The decision to pursue an IPO is made by the top management team (TMT) and board in consultation with investment bankers. In the US, after filing a registration statement with the
Securities and Exchange Commission (SEC), the underwriters (UW) typically market the security using a book-building process (see Benveniste and Spindt (1989)).

Jiang, Leger (2009) present the IPO definition: “Initial public offering (IPO) refers to the first sale of stocks by an unlisted company to the public. Stock exchange listing (followed by public trading in open market) allows the creation of market prices and liquidity. Information asymmetry and agency problems in the market make the valuation of IPOs more difficult than that of listed common stocks so an essential part of the IPO process is the discovery of an appropriate issue price. IPO pricing must compensate for both direct costs (such as underwriting and information disclosure fees) and indirect costs (such as unknown risks specific to the offering, as distinct from systemic risks generally involved in pricing listed common stocks). The complex and special nature of IPO pricing is reflected in an ‘IPO underpricing’ phenomenon, in which statistically significant positive abnormal returns are widely observed in the first day of trading.”

Hopp, Dreherdo (2007) state: “One form of raising capital is selling a company’s shares on capital markets – i.e., going public. Going public is generally done through Initial Public Offering (IPO) where shares are sold to investors, usually at a price below those prevailing on the first day of trading (see Ibbotson (1975) for early evidence).”

Pritsker (2004, 2006) writes: “Two of the principle functions of a well performing financial system are to facilitate risk sharing among investors, and capital formation by firms. The initial public offering (IPO) process serves both of these functions by allowing the initial owners of a firm to raise capital while simultaneously transferring and sharing some of the firm’s risk with the wider investing public.”

Mira (2004) suggests: “The initial public offering (IPO) is the process in which a company offers its shares to the public and becomes a public company. Raising capital through IPO plays an important role in corporate finance and enables economic growth. Indeed, in the past decade, over $500 billion were raised through IPOs in the US markets.”

We would like to comment that the initial public offering of company equity at stock exchanges has been researched in the research articles, reports, presentations and books by a big number of prominent scientists from the top universities (see the compiled chronological list of most frequently cited research articles): The auction of long-term government securities has been researched in Berney (1964). The experimental studies of discrimination versus competition in sealed-bid auction markets have been completed in Smith (1967). The cycle of research works by Eugene F. Fama has been devoted to the dynamics of stock prices changes, including the IPOs. The adjustment of stock prices to new information has been investigated in Fama, Fisher,
Jensen, Roll (1969). A review of theory and empirical work on the efficient capital markets has been conducted in Fama (1970). The cross-section of expected stock returns has been studied in Fama, French (1992). The common risk factors in the returns on the stocks and bonds have been listed in Fama, French (1993). The multifactor explanations of asset pricing anomalies have been suggested in Fama, French (1996). The market efficiency, long-term returns, and behavioral finance have been researched in Fama (1998). The obtained research results over the years of intensive research have been shortly reviewed in Fama, Hansen, French (2013). The stock market mechanism have been investigated in Akerlof (1970). The small business and the new issues market for equities have been characterized in Stoll, Curley (1970). The problems of valuation of the unseasoned equity issues in 1965-1969 in Logue (1973). The complicated question: What’s special about the role of the underwriter reputation and market activities in the IPOs?, has been clearly answered in Logue, Rogalski, Seward, Foster-Johnson (2001). The further evidences on the short-run results for the new issues investors have been presented in Reilly (1973). The pricing of initial equity issues with the focus on the French sealed-bid auction has been discussed in McDonald, Jacquillat (1974). The hot IPOs issue markets have been selected in Ibbotson, Jaffe (1975). The price performance of common stocks new issues has been analyzed in Ibbotson (1975). The mechanisms of the initial public offering have been researched in Ibbotson, Sindeler, Ritter (1988). The transactions cost approach to the theory of financial intermediation has been explored in Benston, Smith (1976). The theory of the firm, including the managerial behavior, agency costs and ownership structure, has been formulated in Jensen, Meckling (1976). The agency costs of free cash flow, corporate finance, and takeovers have been studied in Jensen (1986). The risk, uncertainty, and divergence of opinion have been selected as the topics of research in Miller (1977). The informational asymmetries, financial structure, and financial intermediation have been investigated in Leland, Pyle (1977). The seasoning process of new corporate bond issue has been researched in Weinstein (1978). The prospect theory of the decision making under the risk has been proposed in Kahneman, Tversky (1979). The auctions of shares have been described in Wilson (1979). The measurement of security price performance has been done in Brown, Warner (1980). The price discounts on the new equity issues in the UK and their relationship to the investor subscription in the period 1965 - 1975 have been studied in Buckland, Herbert, Yeomans (1981). The rational expectations, information acquisition, and competitive bidding have been researched in Milgrom (1981). A theory of the auctions and competitive bidding has been created in Milgrom, Weber (1982). The optimal auction design has been suggested in Myerson (1981). A model of the demand for the investment banking advising as well as the distribution services for the new issues have been described in Baron (1982). The
flow of information has been researched in *Dretske (1983)*. The valuable research contributions by *Jay R. Ritter* are well known and highly regarded among the scientists. The innovation and communication: Signaling with partial disclosure in *Bhattacharya, Ritter (1983)*. The “hot issue” market of 1980 has been researched in *Ritter (1984)*. The signaling and the valuation of unseasoned new issues: have been discussed in *Ritter (1984)*. The investment banking, reputation, and the underpricing of initial public offerings have been discussed in *Beatty, Ritter (1986)*. The costs of going public process have been calculated in *Ritter (1987)*. The buying and selling behavior of the individual investors at the turn of the year have been characterized in *Ritter (1988)*. The long-run underperformance of initial public offerings has been evaluated in *Ritter (1991)*. The measurement of the abnormal performance of the stocks has been completed in *Chopra, Lakonishok, Ritter (1992)*. The turn-of-the-year effect has been explained in *Ritter (1992)*. The going public problems have been discussed in *Hanley, Ritter (1992)*. The market's problems with the pricing of initial public offerings have been indentified in *Ibbotson, Sindelar, Ritter (1994)*. The international insights on the initial public offerings have been given in *Loughran, Ritter, Rydqvist (1994)*. The certain information about the initial public offerings has been summarized in *Ibbotson, Ritter (1995)*. The new issue puzzle has been indentified in *Loughran, Ritter (1995)*. The costs of raising capital have been estimated in *Lee, Lochhead, Ritter, Zhao (1996)*. The long-term market overreaction together with the effect of the low-priced stocks has been considered in *Loughran, Ritter (1996)*. The operating performance of firms, conducting the seasoned equity offerings, has been analyzed in *Loughran, Ritter (1997)*. The new issue puzzle has been uncovered in *Loughran, Ritter (1995)*. The initial public offerings have been characterized in *Ritter (1998a, b)*. The institutional affiliation and the role of venture capital, using the evidences from the initial public offerings in *Japan*, have been researched in *Hamao, Packer, Ritter (1998)*. The valuation of the *IPOs* has been discussed in *Kim, Ritter (1999)*. The seven percent solution in the case of the *IPOs* has been proposed in *Chen, Ritter (2000)*. The institutional affiliation and the role of venture capital with the evidences from the initial public offerings in *Japan* have been researched in *Hamao, Packer, Ritter (2000)*. The future of the new issues market has been forecasted in *Ritter (2002)*. A review of the *IPO* activity, pricing and allocations has been made in *Ritter, Welch (2002)*. The decline of inflation and the bull market of 1982 - 1999 have been well described in *Ritter, Warr (2002)*. The question: Why don’t the issuers get upset about the leaving money on the table in the *IPOs*?, has been answered in *Loughran, Ritter (2002)*. The behavioral finance has been described in *Ritter (2003a)*. The differences between the European *IPOs* market and the American *IPOs* market have been found to exist in *Ritter (2003b)*. The research topics on the investment banking and
securities issuance have been studied in Ritter (2003c). The IPO quiet periods have been studied in Ritter, Bradley, Jordan (2003). The IPO quiet periods have been found to exist in Ritter, Bradley, Jordan, Wolf (2004). The question: Why has the IPO underpricing changed over the time?, has been answered in Ritter, Loughran (2004). The recent developments in the corporate finance have been discussed in Ritter (2005). The economic growth and the equity returns have been researched in Ritter (2005). Some facts about the 2004 IPO market have been documented in Ritter (2005). The short interest, institutional ownership, and stock returns have been researched in Ritter, Asquith, Pathak (2005). The question: Do the today's trades affect the tomorrow's IPO allocation?, has been replied in Ritter, Nimalendran, Donghang Zhang (2007). The affiliated mutual funds and the allocation of initial public offerings have been considered in Ritter, Donghang Zhang (2007). The analyst behavior, following the IPOs, has been studied in Bradley, Jordan, Ritter (2008). The forensic finance has been discussed in Ritter (2008). The testing theories of capital structure and the estimation of the speed of adjustment have been researched in Ritter, Huang (2009). The economic consequences of the IPO spinning have been discussed in Ritter, Xiaoding Liu (2010). The marketing of seasoned equity offerings has been described in Ritter, Xiaohui Gao (2010). The local underwriter oligopolies and the IPO underpricing have been discussed in Ritter, Xiaoding Liu (2011). The equilibrium in the initial public offerings market has been described in Ritter (2011). The post-IPO employment and the revenue growth for the US IPOs in the time period from 1996 up to 2010 have been researched in Ritter, Kenney, Patton (2012). The Europe's second markets for the small companies have been analyzed in Ritter, Vismara, Paleari (2012). The problem on the re-energizing of the IPO market has been considered in Ritter (2013). The question: Where have all the IPOs gone?, has been answered in Ritter, Xiaohui Gao, Zhongyan Zhu (2013). The economies of scope and the IPOs activity in Europe have been characterized in Ritter, Signori, Vismara (2013). The corporate financing and investment decisions in the case, when the firms have information that the investors do not have, has been considered in Myers, Majluf (1984). The continuous auction and insider trading problems have been researched in Kyle (1985). The asset pricing and the bid-ask spread have been investigated in Amihud, Mendelson (1986). The shareholders and the stock prices of the IPOs with the evidences from Japan have been characterized in Amihud, Mendelson, Uno (1999). The allocations, adverse selection and cascades in the IPOs with the evidences from the Tel Aviv stock exchange in Israel have been studied in Amihud, Hauser, Kirsh (2001, 2003). The investment banking, reputation, and underpricing of the initial public offerings have been overviewed in Beatty, Ritter (1986). A study of the executive compensation, ownership, and board structure at the initial public offerings, including the managerial
incentives, monitoring, and risk bearing, has been completed in Beatty, Zajac (1994). The issuer expenses and legal liability in the initial public offerings have been researched in Beatty, Welch (1996). The capital raising, underwriting and the certification hypothesis have been described in Booth, Smith (1986). An empirical study on the efficiency of the British primary market and the Swedish primary market with a particular accent on the problem of an access to the mentioned stock markets has been completed in Ridder (1986). The question: Why new issues are underpriced?, has been comprehensively discussed in Rock (1986). The problems on the large shareholders and the corporate control have been analyzed in Shleifer, Vishny (1986). The selected topics on the investor protection and equity markets have been characterized in Shleifer, Wolfenzon (2002). The information quality and the valuation of new IPOs issues have been considered in Titman, Trueman (1986). The coalition-proof of the Nash equilibria has been proposed in Bernheim, Peleg, Whinston (1987). The auctions and bidding techniques have been examined in McAfee, McMillan (1987). An examination of the mispricing, returns and uncertainty for the initial public offerings has been done in Miller, Reilly (1987). The underpricing of new IPOs issues and the choice of auditor as a signal of the investment banker’s reputation has been studied in Balvers, McDonald, Miller (1988). The investment banker prestige and the underpricing of initial public offerings have been investigated in Johnson, Miller (1988). The anatomy of the initial public offerings of common stocks has been presented in Tinic (1988). The signaling by the underpricing in the IPO market has been detected in Allen, Faulhaber (1989). The initial public offerings underpricing has been researched in Barry (1989). The role of venture capital in the creation of public companies, based on the evidence from the going-public process, has been revealed in Barry, Muscarella, Peavy, Vetsuypens (1990). The cycle of research articles co-authored by Lawrence M. Benveniste clarifies a big number of important research problems in the IPO science. The problem: How investment bankers determine the offer price and allocation of new issues has been studied in Benveniste, Spindt (1989). A comparative analysis of the IPO proceeds under the alternative regulatory environments has been made in Benveniste, Wilhelm (1990). The price stabilization as a bonding mechanism in the new equity issues has been shown in Benveniste, Busaba, Wilhelm (1996). An analysis of competing strategies for the IPOs such as the book-building vs. the fixed price has been completed in Benveniste, Busaba (1997). The research on the initial public offerings, going by the book, has been made in Benveniste, Wilhelm (1997). The complex question: Who benefits from the secondary market price stabilization of the IPOs?, has been delicately answered in Benveniste, Erdal, Wilhelm (1998). The evidence of information spillovers in the production of investment banking services has been presented in Benveniste, Ljungqvist, Wilhelm, Yu (2003).
The signaling and the pricing of new IPO issues have been considered in Grinblatt, Hwang (1989). A direct test of the Rock’s model of the pricing of unseasoned issues has been conducted in Koh, Walter (1989). The optimal multi unit auctions have been investigated in Maskin, Riley (1989). A few research papers by Chris J. Muscarella have been considered as of particular research interest, because of the uncovered theoretical mechanisms and practical causes of the underpricing effect. A simple test of the Baron’s model of the IPO underpricing has been suggested in Muscarella, Vetsuypens (1989a). The underpricing of second initial public offering has been investigated in Muscarella, Vetsuypens (1989b). Some new empirical evidences on the firm age, uncertainty, and IPO underpricing have been presented in Muscarella, Vetsuypens (1990). The underpricing at stock exchanges in Germany in 1977 - 1987 has been researched in Uhlir (1989). The series of research articles by Ivo Welch has to be highlighted certainly, because of the innovative research proposals. The seasoned offerings and the pricing of new issues have been researched in Welch (1989). The sequential sales, learning and cascades have been investigated in Welch (1992). The theory and practical evidences on the equity valuation, following the IPO, has been presented in Welch (1996). A review on the IPO activity, pricing and allocations has been completed in Welch, Ritter (2002). The initial public offerings and underwriter reputation have been analyzed in Carter, Manaster (1990). The underwriter reputation, initial returns, and the long run performance of IPO stocks have been investigated in Carter, Dark, Singh (1998). The empirical estimates of beta, when the investors face an estimation risk, have been made in Clarkson, Thompson (1990). The evaluation methods have been reviewed in Husson, Jacquillat (1990). The winner’s curse problem, interest costs and the underpricing of initial public offerings have been researched in Levis (1990). The equity issues and stock price dynamics have been considered in Lucas, McDonald (1990). The structure and governance of venture capital organizations, which invest in the IPOs, have been analyzed in Sahlman (1990). A lawyer's guide to the operation of underwriting syndicates has been written by Allen (1991). Some remarks on the measurement of the information content of stock trades have been presented in Hasbrouck (1991). The investor sentiment and the closed-end fund puzzle have been highlighted in Lee, Shleifer, Thaler (1991). The venture capitalists certification in the initial public offerings have been explained in Megginson, Weiss (1991). The introduction to the corporate finance have been made in Megginson, Smart (2009). The problems on the auditor credibility and the initial public offerings have been solved in Menon, Williams (1991). The pre-play communication, participation restrictions and efficiency in the initial public offerings have been discussed in Spatt, Srivastava (1991). The long run efficiency of the IPO pricing has been considered in Cotter (1992). The litigation risk, intermediation, and the
underpricing of initial public offerings have been studied in Hughes, Thakor (1992). Theory and evidence on the effect of the secondary market on the pricing of the initial public offerings have been presented in Mauer, Senbet (1992). The elaborate research ideas on the IPOs have been proposed in a series of research articles by Reena Aggarwal. The aftermarket performance of the initial public offerings in Latin America has been researched in Aggarwal, Leal, Hernandez (1992). The question: Why the initial public offerings are underpriced has been answered, using the evidences from Switzerland in Kunz, Aggarwal (1994). The stabilization activities by the underwriters after the initial public offerings have been investigated in Aggarwal (2000). The price discovery in the initial public offerings as well as the role of the lead underwriter in the initial public offerings have been documented in Aggarwal, Conway (2000). The empirical evidences on the institutional allocations in the initial public offerings have been presented in Aggarwal, Prabhala, Puri (2002). The strategic IPO underpricing, information momentum, and lockup expiration selling have been studied in Aggarwal, Krigman, Womack (2002). The allocation of the initial public offerings and flipping activity have been researched in Aggarwal (2003). The effect of the trading system on the underpricing of initial public offerings has been investigated in Affleck-Graves, Hegde, Miller, Reilly (1993). The theory and evidences on the common stock offerings across the business cycle have been presented in Choe, Masulis, Nanda (1993). The auctions of divisible goods have been researched in Back, Zender (1993). The auctions of divisible goods with the endogenous supply have been researched in Back, Zender (2001). The cycle of research articles by Thomas J. Chemmanur stems the idea of the IPO waves. A dynamic model on the pricing of initial public offerings has been suggested in Chemmanur (1993). The question: Why include warrants in new equity issues?, has been answered in the theory of unit IPOs in Chemmanur, Fulghieri (1997). A theory of the going-public decision has been proposed in Chemmanur, Fulghieri (1999). A dynamic model of the choice between the fixed-price offerings and the auctions in the IPOs and privatizations has been proposed in Chemmanur, Liu (2003). The institutional trading, allocation sales, and private information in the IPOs have been discussed in Chemmanur, Hu (2007). The topics on the product market advertising and new equity issues have been discussed in Chemmanur, Yan (2009). The role of institutional investors in the seasoned equity offerings has been highlighted in Chemmanur, He, Hu (2009). The going public decision and the product market have been reviewed in Chemmanur, He, Nandy (2010). The heterogeneous beliefs, short sale constraints, and an economic role of the underwriter in the IPOs have been explained in Chemmanur, Krishnan (2012). The theory and evidences on the IPO waves, product market competition, and going public decision have been presented in Chemmanur, He (2012). The long-term market
overreaction or biases in the computed returns have been revealed in Conrad, Kaul (1993). The short-run and long-run performance of the Korean IPOs in 1980-1990 have been researched in Dhatt, Kim, Lim (1993). The IPO underpricing and the insurance against legal liability have been described in Drake, Vetsuypens (1993). The options, short sales, and market completeness have been researched in Figlewski, Webb (1993). The underpricing of the initial public offerings and the partial adjustment phenomenon have been researched in Hanley (1993). Evidence on the strategic allocation of initial public offerings has been given in Hanley, Wilhelm (1995). The Japanese initial public offerings at the time of Japan's financial markets restructuring have been researched in Hebner, Hiraki (1993). The implications for the stock market efficiency have been studied in Jegadeesh, Weinstein, Titman (1993a). An empirical investigation of the IPO returns and subsequent equity offerings have been conducted in Jegadeesh, Weinstein, Welch (1993b). The winner’s curse, legal liability, and long-run price performance of the initial public offerings in Finland have been investigated in Keloharju (1993). The strategic behavior and underpricing in the uniform price auctions, including the evidences from the Finnish treasury auctions, have been described in Keloharju, Nyborg, Rydqvist (2004). The post-IPO performances in France have been studied in Leleux (1993). The post-issue performance of the IPOs in the European IPO markets has been studied in Leleux, Muzyka (1997). The UK experience as far as the long-run performance of the initial public offerings in 1980 - 1988 has been shared in Levis (1993). The UK IPO market in 2000 has been analyzed in Levis (2004). The cycle of exceptional research articles by Tim Loughran presents the important research results on the short- and long-term performances of the IPOs. The underperformance of the initial public offerings, comparing the NYSE vs. NASDAQ data, has been analyzed in Loughran (1993). The international insights on the initial public offerings have been presented in Loughran, Ritter, Rydqvist (1994). The new issue puzzle has been researched in Loughran, Ritter (1995). The operating performance of firms, conducting the seasoned equity offering, has been investigated in Loughran, Ritter (1997). The uniformly least powerful tests of market efficiency have been completed in Loughran, Ritter (2000). The problem: Why don’t the issuers get upset about leaving the money on the table in the IPOs?, has been discussed in Loughran, Ritter (2002). The question: Why has the IPO underpricing changed over time?, has been considered in Loughran, Ritter (2003, 2004). The underwriter price support and the IPO underpricing puzzle have been uncovered in Ruud (1993). The compensation, participation, restrictions, and the underpricing of initial public offerings with the clear evidences from Sweden have been provided in Rydqvist (1993). A reputation based model in the case of the New Zealand IPO underpricing has been discussed in Vos, Cheung (1993). The accounting choices by the issuers of the initial public
offerings have been reviewed in *Friedlan (1994)*. The post-issue operating performances of *IPO* firms have been analyzed in *Jain, Kini (1994)*. The underpricing of the *Canadian* initial public offerings in 1971 – 1992 has been researched in *Jog, Srivastava (1994)*. The voluntary disclosure of management earnings forecasts in the *IPOs* as well as the impact on the underpricing and post-issue return performance in *Jog, McConomy (1999)*. The question: Why the initial public offerings are underpriced has been answered, using the evidences from *Switzerland* in *Kunz, Aggarwal (1994)*. The topics on the venture capitalists and the decision to go public have been described in *Lerner (1994)*. The pricing of initial public offerings with the focus on the tests of the adverse-selection and the signaling theories has been discussed in *Michaely, Shaw (1994)*. The conflict of interest and the credibility of underwriter analyst recommendations have been investigated in *Michaely, Womack (1999)*. The aftermarket support and underpricing of the initial public offerings have been researched in *Schultz, Zaman (1994)*. The pseudo market timing and the long-run underperformance of the *IPOs* have been discussed in *Schultz (2003)*. The underwriter price support and the *IPO* underpricing puzzle have been considered in *Degeorge (1995)*. The application of the book-building method in the *IPOs* has been described in *Degeorge, Derrien, Womack (2005)*. The private communications on the *IPO* underpricing, long term performance and emerging issues markets have been conducted in *Gerstein (1995, 1996)*. The optimal investment, monitoring, and staging of venture capital have been described in *Gompers (1995)*. The topics on the venture capital and the creation of public companies have been researched in *Gompers, Lerner (1997)*. The really long-term performance of the initial public offerings in the *pre-Nasdaq* era have been considered in *Gompers, Lerner (2001, 2003a, b)*. The aftermarket performance of the initial public offerings in *Korea* has been explained in *Kim, Krinsky, Lee (1995)*. The going public techniques in the 1980s with the evidences from Sweden have been explained in *Rydqvist, Högholm (1995)*. The underperformance in the long-run stock returns, following the seasoned equity offerings, has been discussed in *Spiess, Affleck-Graves (1995)*. The *IPO* and the first seasoned equity sale, including the issue proceeds, owner/manager's wealth, and under-pricing signal, have been researched in *Spiess, Pettway (1997)*. The long-run performance of stock returns, following the debt offerings, has been described in *Spiess, Affleck-Graves (1999)*. The insider ownership and the decision to go public have been characterized in *Zingales (1995)*. The series of research articles by *Brad M. Barber* deals with the long-run abnormal stock returns. The detection of the long-run abnormal stock returns, using the test statistics, has been described in *Barber, Lyon (1996a, 1997)*. The problem: How can the long-run abnormal stock returns be both positively and negatively biased?, has been solved in *Barber, Lyon (1996b)*. The effect of attention on the buying behaviour of the individual
and institutional investors has been characterized in Barber, Odean (2008). The ownership dispersion, costly information, and IPO underpricing have been investigated in Booth J R, Chua (1996). The technology shocks, regulation, and the IPO market have been researched in Booth J R, Booth L (2003). The German perspective on the emission of shares has been provided in Borggreve, Dobrikat (1996). The principles of corporate finance, including the IPO, have been discussed in Brealey, Myers (1996). The market microstructure, asset pricing and stock returns have been analyzed in Brennan, Subrahmanyam (1996). The international methods of the initial public offerings allocation have been reviewed in Chowdhry, Sherman (1996). The stabilization, syndication, and pricing of the IPOs have been discussed in Chowdhry, Nanda (1996). The liquidity, information, and infrequently traded stocks have been considered in Easley, Kiefer, O’Hara, Paperman (1996). The treatise on the law of securities regulation has been written by Hazen (1996). The bank information monopolies as well as the mix of private and public debt claims have been discussed in Houston, James (1996). The stock analyst valuations, following the initial public offerings, have been analyzed in Houston, James, Karceski (2004). The market-to-book ratios, equity retention, and management ownership in Finnish initial public offerings have been researched in Keloharju, Kulp (1996). The coordination, identity and learning by the firms before the IPO decision have been described in Kogut, Zander (1996). The measurement of the long-horizon security price performance has been done in Kothari, Warner (1996, 1997). The capital markets research has been performed in Kothari (2001). The Australian IPO underpricing in the short and long run has been studied in Lee, Taylor, Walter (1996). The expected and realized returns for the Singaporean IPOs in the short- and long- time terms have been evaluated in Lee, Taylor, Walter (1996). The discriminatory treasury auctions versus uniform treasury auctions: have been researched in Nyborg, Sundaresan (1996). The effect of removing price limits and introducing auctions upon short-term IPO returns in the case of the Japanese IPOs has been investigated in Pettway, Kaneko (1996). The approaches to the prediction of stock results has been described in Périer (1996). The short and long-run performance of the initial public offerings in the Austrian stock market have been discussed in Aussenegg (1997). The cycle of research works by Alon Brav has been devoted to the short- and long- time performances of the IPOs. The research on the long-run performance of the initial public offerings, using the evidences from the venture and non-venture capital-backed companies has been presented in Brav, Gompers (1997). The long-horizon IPO returns study, using the Bayesian approach, have been completed in Brav (2000). The question: Is the abnormal return, following the equity issuances, anomalous?, has been answered in Brav, Geczy, Gompers (2000). The insider trading subsequent to the initial public offerings with the evidence
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In this empirical research, we prefer to limit our research considerations by setting the boundary conditions: The initial public offerings take place at the global stock exchanges in the diffusion-type financial systems in the imperfect highly volatile global capital markets with the induced nonlinearities. Since the time, when the first financial systems were established to govern the money markets in Bagehot (1873, 1897), Fisher (1892), the diffusion theory has been

The authors would like to make an additional comment that the diffusion theory in the econophysics has been frequently complemented by the numerous important research discoveries from the theoretical and experimental researches on the diffusion phenomena in the physics, chemistry and mathematics in Abramov, Fogel’, Slyozov, Tanatarov, O. P. Ledenyov (2012), Ledenyov V O, Ledenyov D O, Ledenyov O P (2012f), Ledenyov D O, Ledenyov V O (2012e).

Finally, let us say that this short condensed research article has been written, keeping in the mind the following research topics discussion order:

1. The theories on the initial public offering of company equity at the stock exchanges in the imperfect highly volatile global capital markets with the induced nonlinearities;
2. The valuation of the initial public offering of company equity at the stock exchanges in the imperfect highly volatile global capital markets with the induced nonlinearities;
3. The underpricing of the initial public offering of company equity at the stock exchanges in the imperfect highly volatile global capital markets with the induced nonlinearities;
4. The long term performance of the initial public offering of company equity at the stock exchanges in the imperfect highly volatile global capital markets with the induced nonlinearities;
5. The information absorption by the investors on the company equity value in time of the initial public offering at the stock exchanges in the imperfect highly volatile global capital markets with the induced nonlinearities.

Theories on initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

Beginning the discussion on the initial public offerings, let us comment that, in Europe, the first IPO was the public offering of the Vereenigde Oost-Indische Compagnie (Dutch East India Company) in The Netherlands in 1602 in Joseph Penso de la Vega (1668, 1996), Wikipedia (2014), Shiryaev (1998a). In the United States, the first IPO was the public offering of the Bank of North America around 1783 in Wikipedia (2014). Let us continue the discussion on the theories and practices on the initial public offering, explaining the main reasons for the IPOs.

Welch, Ritter (2002) write: “The first question must be "why do firms go public?" In most cases, the primary answer is the desire to raise equity capital for the firm and to create a public market in which the founders and other shareholders can convert some of their wealth into cash at a future date. Nonfinancial reasons, such as increased publicity, play only a minor role for most firms: absent cash considerations, most entrepreneurs would rather just run their firms than concern themselves with the complex public market process. This still leaves the question of why IPOs are the best way for entrepreneurs to raise capital, and why the motivation to do an IPO is stronger in some situations or times (see Table 1) than in others. Stepping outside our own sample, Gompers and Lerner (2001) report that there were fewer U.S. IPOs from 1935 - 1959 than the 683 in 1969 alone, and La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) report wide differences in IPO activity across countries.”

Welch, Ritter (2002) distinguish the two big categories of theories on the going public decisions: “1. Life cycle theories:

a) The first formal theory of the going public decision appeared in Zingales (1995). He observed that it is much easier for a potential acquirer to spot a potential takeover target when it is public. Moreover, entrepreneurs realize that acquirers can pressure targets on pricing concessions more than they can pressure outside investors. By going public, entrepreneurs thus help facilitate the acquisition of their company for a higher value than what they would get from an outright sale. In contrast, Black and Gilson (1998) point out that entrepreneurs often regain control from the venture capitalists in venture capital-backed companies at the IPO. Thus, many IPOs are not so much exits for the entrepreneur as they are for the venture capitalists.
b) Chemmanur and Fulghieri (1999) develop the more conventional wisdom that IPOs allow more dispersion of ownership, with its advantages and disadvantages. Pre-IPO “angel” investors or venture capitalists hold undiversified portfolios, and therefore are not willing to pay as high a price as diversified public-market investors. There are fixed costs associated with going public, however, and proprietary information cannot be costlessly revealed—after all, small investors cannot take a tour of the firm and its secret inventions. Thus, early in its life cycle a firm will be private, but if it grows sufficiently large, it becomes optimal to go public.

c) Public trading per se has costs and benefits. Maksimovic and Pichler (2001) point out that a high public price can attract product market competition. Public trading, however, can in itself add value to the firm, as it may inspire more faith in the firm from other investors, customers, creditors, and suppliers. Being the first in an industry to go public sometimes confers a first-mover advantage. The quintessential company often cited as an example is Netscape. However, Spyglass was a browser company that went public two months before Netscape—and quickly faltered under Netscape’s competition. Schultz and Zaman (2001) report that many internet firms that went public in the late 1990s pursued an aggressive acquisition strategy, which they interpret as an attempt to pre-empt competitors.

2. Market-timing theories

a) Lucas and McDonald (1990) develop an asymmetric information model where firms postpone their equity issue if they know they are currently undervalued. If a bear market places too low a value on the firm, given the knowledge of entrepreneurs, then they will delay their IPOs until a bull market offers more favorable pricing. In Choe, Masulis, and Nanda (1993), firms avoid issuing in periods where few other good-quality firms issue. Other theories have argued that markets provide valuable information to entrepreneurs (“information spillovers”), who respond to increased growth opportunities signaled by higher prices (Subramanyam and Titman (1999), Schultz (2000)).

b) We suggest that in addition to these rational theories for IPO volume fluctuations, a plausible semi-rational theory without asymmetric information can also explain cycles in issuing activity: entrepreneurs’ sense of enterprise value derives more from their internal perspective, their day-to-day involvement with the underlying business fundamentals, and less so from the public stock market. Sudden changes in the value of publicly traded firms are not as quickly absorbed into the private sense of value held by entrepreneurs. Thus entrepreneurs adjust their valuation with a lag. As a result, even if the market price is driven by irrational public sentiment or the entrepreneur’s price is driven by irrational private sentiment, entrepreneurs are more inclined to sell shares after valuations in the public markets have increased.”
Welch, Ritter (2002) note: “We interpret the evidence on the going public decision as suggesting that firms go public in response to favorable market conditions, but only if they are beyond a certain stage in their life cycle. Perhaps the most important unanswered question is why issuing volume drops so precipitously following stock market drops. Although offer prices are lowered, many firms withdraw their offering rather than proceed with their IPO. In other words, why is there quantity adjustment, rather than price adjustment? This is a puzzle not only for the IPO market, but for follow-on offerings as well.”

Tab. 1 shows a number of IPOs, first-day returns, gross proceeds, amount of money left on the table, and long run performance by cohort year, 1980-2001 in Welch, Ritter (2002).

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of IPOs</th>
<th>Average First-day Return</th>
<th>Aggregate Gross Proceeds, millions</th>
<th>Aggregate Money Left on the Table, millions</th>
<th>Average 3-year Buy-and-hold Return</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>IPOs</td>
<td>Market-adjusted</td>
<td>Style-adjusted</td>
</tr>
<tr>
<td>1980</td>
<td>70</td>
<td>14.5%</td>
<td>$2,020</td>
<td>$408</td>
<td>88.2%</td>
</tr>
<tr>
<td>1981</td>
<td>191</td>
<td>5.9%</td>
<td>$4,613</td>
<td>$264</td>
<td>12.8%</td>
</tr>
<tr>
<td>1982</td>
<td>77</td>
<td>11.4%</td>
<td>$1,839</td>
<td>$245</td>
<td>32.2%</td>
</tr>
<tr>
<td>1983</td>
<td>442</td>
<td>10.1%</td>
<td>$15,348</td>
<td>$1,479</td>
<td>15.4%</td>
</tr>
<tr>
<td>1984</td>
<td>172</td>
<td>3.6%</td>
<td>$3,543</td>
<td>$86</td>
<td>27.7%</td>
</tr>
<tr>
<td>1985</td>
<td>179</td>
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<td>$6,963</td>
<td>$354</td>
<td>7.6%</td>
</tr>
<tr>
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<td>378</td>
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<td>$19,653</td>
<td>$1,030</td>
<td>18.6%</td>
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<td>$1,019</td>
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<tr>
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<td>105</td>
<td>8.1%</td>
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<td>10.8%</td>
<td>$5,611</td>
<td>$454</td>
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<td>1991</td>
<td>273</td>
<td>12.1%</td>
<td>$15,923</td>
<td>$1,788</td>
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<tr>
<td>1992</td>
<td>385</td>
<td>10.2%</td>
<td>$26,373</td>
<td>$2,148</td>
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<td>483</td>
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<td>$3,915</td>
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<td>387</td>
<td>9.8%</td>
<td>$19,323</td>
<td>$1,650</td>
<td>74.1%</td>
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<tr>
<td>1995</td>
<td>432</td>
<td>21.5%</td>
<td>$28,347</td>
<td>$5,033</td>
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<tr>
<td>1996</td>
<td>621</td>
<td>16.7%</td>
<td>$45,940</td>
<td>$7,383</td>
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<tr>
<td>1997</td>
<td>432</td>
<td>13.8%</td>
<td>$31,701</td>
<td>$4,664</td>
<td>67.7%</td>
</tr>
<tr>
<td>1998</td>
<td>267</td>
<td>22.3%</td>
<td>$34,628</td>
<td>$5,352</td>
<td>27.1%</td>
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<tr>
<td>1999</td>
<td>457</td>
<td>71.7%</td>
<td>$66,770</td>
<td>$37,943</td>
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</tr>
<tr>
<td>2000</td>
<td>346</td>
<td>56.1%</td>
<td>$62,593</td>
<td>$27,682</td>
<td>-64.7%</td>
</tr>
<tr>
<td>2001</td>
<td>80</td>
<td>14.0%</td>
<td>$34,344</td>
<td>$2,973</td>
<td>n.a.</td>
</tr>
</tbody>
</table>

Tab. 1. Number of IPOs, first-day returns, gross proceeds, amount of money left on the table, and long run performance by cohort year, 1980-2001 (after Welch, Ritter (2002)).
Roosenboom, van der Goot (2003) analyzed the IPOs on the Euronext Amsterdam in The Netherlands: “We analyze a sample of 111 IPOs on Euronext Amsterdam during the years 1984-1999.” Tab. 2 provides the summary statistics for 111 IPOs on the Euronext Amsterdam from January 1984 to December 1999, and Fig. 1 shows the time distribution of IPOs in the Netherlands in Roosenboom, van der Goot (2003).

<table>
<thead>
<tr>
<th></th>
<th>Average</th>
<th>Median</th>
<th>Standard deviation</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market capitalization (million Euro)</td>
<td>426.77</td>
<td>61.99</td>
<td>1,507.99</td>
<td>13,453.20</td>
<td>11.54</td>
</tr>
<tr>
<td>Total assets (million Euro)</td>
<td>162.61</td>
<td>35.10</td>
<td>368.41</td>
<td>2,205.37</td>
<td>2.29</td>
</tr>
<tr>
<td>Proceeds (million Euro)</td>
<td>89.38</td>
<td>21.70</td>
<td>212.47</td>
<td>1,476.563</td>
<td>2.18</td>
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<tr>
<td>Primary offering (%)</td>
<td>33.83</td>
<td>23.40</td>
<td>33.42</td>
<td>100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Underpricing (%)</td>
<td>9.45</td>
<td>2.50</td>
<td>19.77</td>
<td>97.73</td>
<td>-31.24</td>
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<tr>
<td>Sales growth (%)</td>
<td>39.25</td>
<td>24.21</td>
<td>50.81</td>
<td>308.03</td>
<td>-33.96</td>
</tr>
<tr>
<td>Return on sales (%)</td>
<td>11.24</td>
<td>12.39</td>
<td>25.25</td>
<td>61.18</td>
<td>-199.77</td>
</tr>
<tr>
<td>Leverage (%)</td>
<td>12.26</td>
<td>6.23</td>
<td>16.28</td>
<td>95.20</td>
<td>0.00</td>
</tr>
<tr>
<td>Company age (years)</td>
<td>28.08</td>
<td>15.00</td>
<td>32.44</td>
<td>152.00</td>
<td>0.50</td>
</tr>
<tr>
<td>Pre-IPO management ownership (%)</td>
<td>44.35</td>
<td>33.05</td>
<td>40.52</td>
<td>100.00</td>
<td>0.00</td>
</tr>
<tr>
<td>Market-to-book ratio</td>
<td>6.19</td>
<td>3.63</td>
<td>6.96</td>
<td>41.53</td>
<td>0.57</td>
</tr>
</tbody>
</table>

Tab. 2. Summary statistics for 111 IPOs on Euronext Amsterdam from January 1984 to December 1999 (after Roosenboom, van der Goot (2003)).

Fig. 1. Time distribution of IPOs in the Netherlands (after Roosenboom, van der Goot (2003)).
Let us continue with the research statements by Gajewski, Gresse (2006): “In recent years, the market for initial public offerings (IPOs) in Europe has been characterized by several important developments. Two major characteristics of this period are the outperformance of ‘new economy’ IPOs and the growth of book-building as the favourite choice among IPO underwriting procedures. Another striking feature of the landscape of European IPOs is its ‘cyclicality’. In the late 90s, the growth of the internet bubble induced a large number of new economy firms to go public, resulting in a hot issue market from 1998 to 2000. This IPO-euphoria period was also characterized by high levels of initial returns, meaning that most IPO companies “left money on the table”. Nevertheless, since 2000, with the substantial decline of most New Markets, primary markets have become more apathetic than ever on most stock exchanges. Finally, with the introduction of the Euro in twelve European countries, investors in new listings tend to establish their financial strategies at a European level instead of clustering in national markets.”

Tab. 3 shows the IPOs number of domestic firms per year and per country with the investment funds excluded in Gajewski, Gresse (2006).

<table>
<thead>
<tr>
<th></th>
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<tr>
<td>Austria</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>4</td>
<td>7</td>
<td>6</td>
<td>3</td>
<td>8</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>Belgium*</td>
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<td>3</td>
<td>13</td>
<td>18</td>
<td>17</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>22</td>
<td>59</td>
<td>82</td>
<td>226</td>
<td>68</td>
<td>76</td>
<td>36</td>
<td>15</td>
<td>14</td>
<td>20</td>
<td>800</td>
</tr>
<tr>
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<td>6</td>
<td>7</td>
<td>15</td>
<td>22</td>
<td>17</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>16</td>
<td>5</td>
<td>7</td>
<td>10</td>
<td>5</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
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<td>7</td>
<td>12</td>
<td>12</td>
<td>27</td>
<td>19</td>
<td>9</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>99</td>
</tr>
<tr>
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<td>20</td>
<td>35</td>
<td>67</td>
<td>134</td>
<td>134</td>
<td>21</td>
<td>6</td>
<td>0</td>
<td>6</td>
<td>443</td>
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<tr>
<td>Greece</td>
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<td>12</td>
<td>23</td>
<td>37</td>
<td>52</td>
<td>21</td>
<td>15</td>
<td>13</td>
<td>9</td>
<td>220</td>
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<tr>
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<td>15</td>
<td>13</td>
<td>21</td>
<td>33</td>
<td>48</td>
<td>18</td>
<td>13</td>
<td>10</td>
<td>9</td>
<td>192</td>
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<tr>
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<td>21</td>
<td>18</td>
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<td>57</td>
<td>28</td>
<td>13</td>
<td>9</td>
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<td>32</td>
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<td>4</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>40</td>
</tr>
<tr>
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<td>17</td>
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<td>32</td>
<td>47</td>
<td>44</td>
<td>19</td>
<td>8</td>
<td>4</td>
<td>5</td>
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<td>14</td>
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<td>20</td>
<td>9</td>
<td>36</td>
<td>1</td>
<td>5</td>
<td>4</td>
<td>12</td>
<td>171</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>285</td>
<td>347</td>
<td>217</td>
<td>169</td>
<td>161</td>
<td>366</td>
<td>236</td>
<td>219</td>
<td>194</td>
<td>413</td>
<td>2,607</td>
</tr>
<tr>
<td>Total</td>
<td>467</td>
<td>555</td>
<td>571</td>
<td>704</td>
<td>614</td>
<td>843</td>
<td>392</td>
<td>297</td>
<td>254</td>
<td>514</td>
<td>5,211</td>
</tr>
</tbody>
</table>

**Source: Bolsa de Madrid.

**Tab. 3. IPOs: Number per year and per country domestic firms only - investment funds excluded (after Gajewski, Gresse (2006)).**
Tab. 4 shows the *IPOs*: New capital raised per year and per country - investment funds excluded; Tab. 5 presents the data on the *IPOs*: End-of-year market value per year and per country domestic firms only - investment funds excluded in Gajewski, Gresse (2006).

Tab. 4. *IPOs*: New capital raised per year and per country- investment funds excluded (after Gajewski, Gresse (2006)).

<table>
<thead>
<tr>
<th></th>
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</tr>
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<tbody>
<tr>
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<td>500</td>
<td>1,146</td>
<td>1,498</td>
<td>1,900</td>
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<td>157</td>
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<td>545</td>
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<td>60</td>
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<td>899</td>
<td>2,843</td>
<td>1,000</td>
<td>92</td>
<td>61</td>
<td>95</td>
<td>6,436</td>
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<tr>
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<td>67,532</td>
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<td>51,270</td>
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<td>667</td>
<td>343</td>
<td>1,356</td>
<td>5,417</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>3,375</td>
<td>14,253</td>
<td>1,074</td>
<td>5,692</td>
<td>7,355</td>
<td>15,186</td>
<td>10,791</td>
<td>8,259</td>
<td>6,546</td>
<td>10,644</td>
<td>83,186</td>
</tr>
</tbody>
</table>

Source: WFE (WFE European statistics are originally provided by FESE.)
Statistics include domestic firms only and exclude investment funds. All figures are in €.
* Statistics for all Euronext.
** Statistics for BMEx.

Tab. 5. *IPOs*: End-of-year market value per year and per country domestic firms only - investment funds excluded (after Gajewski, Gresse (2006)).
Gajewski, Gresse (2006) describe the current stock exchange listing process on the European stock exchanges: “A request for a stock exchange listing must be made on the basis of an introduction prospectus whose contents are subject to regulation and which is generally filed a few months (120 days on average according to Schuster (2003)) before the admission date. Typically, a universal or an investment bank, called ‘the underwriter’, is involved in developing the admission statement and is in charge of the underwriting and floatation process. The underwriter is chosen by the IPO candidate after a so-called ‘beauty contest’ at which banks or other financial institutions present their proposals for the IPO. For most IPOs, the underwriter assembles a banking syndicate, i.e. a combination of several banks or financial institutions. As the ‘lead manager’, the underwriter is responsible for implementing the IPO while other members of the syndicate only undertake underwriting or placement functions. The banks that make up the syndicate are also selected through a ‘beauty contest’ in which individual banks present their estimates of the firm’s value, the issue price, the demand for the issuer’s shares as well as the costs of the issue. In order to compile the IPO prospectus, lawyers, together with the underwriting bank, conduct due diligence, that is an examination of the company regarding its legal, financial, and commercial aspects. The legal due diligence includes an examination of the company’s major contracts, liabilities, patents and other legal facts. The commercial due diligence contains an analysis of the issuing company’s fields of business, market positions, development strategies, human resources, management, etc. Financial due diligence entails financial statements, auditors’ reports for cases in which audited accounts are required, investment planning, etc. While due diligence is exclusively for internal use, it serves as a basis for the offering prospectus, which, at the minimum, contains information on the shares to be admitted, general information about the issuer and associated companies, a description of the issuer’s business activities, a presentation of the issuer’s net assets, financial position and results of operations. The actual minimum content of the admission document and listing requirements are usually defined by the regulatory body of the primary market and differ from country to country (cf. I.2). The next step of the floatation process is to obtain the approval of the admission authority, i.e. the market supervisor or the exchange itself or both. Lastly, the initial pricing and placement of the shares are organized either by the underwriter or in co-ordination with the exchange, depending on the institutional setting (cf. I.3).”

Gajewski, Gresse (2006) add: “Main markets are characterized by three common requirements, specifically accounting records history, capital size and floating capitalisation.”

Tabs. 6a, b, c show the IPO listing requirements on the European regulated markets, and Tab. 7 represents the IPO mechanisms by country in Gajewski, Gresse (2006).
<table>
<thead>
<tr>
<th>Country</th>
<th>Exchange</th>
<th>Admission authority</th>
<th>Main Market</th>
<th>Parallel Market</th>
<th>New Market</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>VSE</td>
<td>Official Market</td>
<td>General Standard</td>
<td>Semi-Official Market</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shares with a par value</td>
<td>Market value &gt; EUR 2.9 million</td>
<td>Shares with a par value</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free float &gt; EUR 725,000</td>
<td>—</td>
<td>Free float &gt; EUR 725,000</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Non par value shares</td>
<td>—</td>
<td>Non par value shares</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total number of shares &gt; 20,000</td>
<td>—</td>
<td>Total number of shares &gt; 10,000</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free float &gt; 10,000 shares</td>
<td>—</td>
<td>Free float &gt; 2,000 shares</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Financial statements for the 3 preceding business years</td>
<td>—</td>
<td>Financial statements for the 3 preceding business years</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Same as General Standard</td>
<td>—</td>
<td>Same as General Standard</td>
<td>—</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Accounting in accordance with U.S. GAAP and IFRS</td>
<td>—</td>
<td>Accounting in accordance with U.S. GAAP and IFRS</td>
<td>—</td>
</tr>
<tr>
<td>Belgium</td>
<td>CBF</td>
<td>Premier Marché</td>
<td>Market value &gt; EUR 15 millions</td>
<td>Second Marché</td>
<td>Neovers Marché</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Value of the shares offered to the public &gt; EUR 5 million</td>
<td>Created in 1997 – closed in 2005</td>
<td>High-growth companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Free float &gt; 25%</td>
<td>Capitalisation: EUR 2 million</td>
<td>Capitalisation: EUR 2 million</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>At least 3 years of existence</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Financial reporting in accordance with Belgian standards and IFRS</td>
<td>Issuance: EUR 5 million</td>
<td>Capital increase: 10% of offered shares</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Free float: &gt; 25% (10% in some cases)</td>
<td>Lock-up period for managers: —</td>
<td></td>
</tr>
<tr>
<td>France</td>
<td>AMF and Euromet Paris</td>
<td>Premier Marché</td>
<td>Market capitalisation: EUR 700/800 million</td>
<td>Second Marché</td>
<td>Neovers Marché</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Created in 1993 – closed in 2005</td>
<td>Created in 1995 – closed in 2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public: &gt; 500,000 shares</td>
<td>Market capitalisation: EUR 12/15 million</td>
<td>High-growth companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Filed audited accounts over a period of 2 years prior to the date of the listing</td>
<td>Capital increase: 10% of offered shares</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Number of shares distributed to the public: &gt; 10% and EUR 4.5 million</td>
<td>Lock-up period: 3 years for 80% of the shares until 1998; from 1999 to 2003 80% during a year or 6 months; since 2003 1 year for 100% of the shares</td>
<td></td>
</tr>
<tr>
<td>Netherlands</td>
<td>Amsterdam</td>
<td>Officialisch Markt</td>
<td>Sharesholders’ equity: EUR 5 million</td>
<td>EuroNM Amsterdam</td>
<td>Neovers Marché</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public: &gt; 10%</td>
<td>Created in 1997 in replacement of the Official Parallel Market (closed in 1994) – closed in 2005</td>
<td>High-growth companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Capitalisation: EUR 1.5 millions</td>
<td>Capitalisation: EUR 2.5 millions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6-month lock-up period for managers</td>
<td>Number of shares distributed to the public: &gt; 100,000 and &gt; 20%</td>
<td>Number of shares distributed to the public: &gt; 100,000 and &gt; 20%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Capital increase: 10% of offered shares</td>
<td>Capital increase: 10% of offered shares</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Lock-up period for managers: 3 years applicable to 80% of the shares</td>
<td>Lock-up period</td>
<td></td>
</tr>
<tr>
<td>Portugal</td>
<td>CMVM</td>
<td>Main Market</td>
<td>Market capitalisation: &gt; EUR 2.5 million</td>
<td>Second Market</td>
<td>Novo Mercado</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Total number of shares &gt; 500,000</td>
<td>Created in 2005</td>
<td>Closed in 2005</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public: &gt; 25%</td>
<td>Market capitalisation: EUR 625,000</td>
<td>High-growth companies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 year prior to the date of the listing</td>
<td>Number of shares distributed to the public: &gt; 10%</td>
<td>Market capitalisation: EUR 2.5 million</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Filed audited accounts over a period of 2 year prior to the date of the listing</td>
<td>Number of shares distributed to the public: &gt; 100,000 and &gt; 20%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Capital increase: 10% of offered shares</td>
<td>Capital increase: 10% of offered shares</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Lock-up period</td>
<td>Lock-up period</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Euro Marché</td>
<td>Sharesholders’ equity: EUR 1.5 millions</td>
<td>Alternative</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public: &gt; 25%</td>
<td>Unregulated market</td>
<td>No requirement on size, sector, growth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 year prior to the date of the listing</td>
<td>2-year track record at least</td>
<td>Without public offer</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>With public offer</td>
<td>No float requirement</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Float: EUR 2.5 million</td>
<td>Offering circular with no authority approval</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Prospecto to be approved by the AMF</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Without public offer</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>No float requirement</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>Offering circular with no authority approval</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Finland</td>
<td>HSE</td>
<td>Main List</td>
<td>Capital resources: EUR 2 million</td>
<td>I List</td>
<td>NM List</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sharesholders’ equity: EUR 2 million</td>
<td>No size requirement</td>
<td>Market capitalisation: EUR 2 million</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Filed audited accounts over a period of 2 years prior to the date of the listing</td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public: &gt; 25%</td>
<td>Number of shares distributed to the public: &gt; 15%</td>
<td>Number of shares distributed to the public: &gt; 15%</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Voting rights in the general public: &gt; 10%</td>
<td>Voting rights in the general public: &gt; 15%</td>
<td>3-year business plan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>—</td>
<td>3-year business plan</td>
<td>Lock-up period for main shareholders if existence length &gt; 3 years</td>
<td></td>
</tr>
</tbody>
</table>

**Tab. 6a.** Listing requirements on European regulated markets (after Gajewski, Gresse (2006)).
<table>
<thead>
<tr>
<th>Germany</th>
<th>Deutsche Börse</th>
<th>Frankfurt Stock Exchange</th>
<th>Official Market</th>
<th>Regulated Market – General Standard</th>
<th>Neuer Markt</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>General Standard</td>
<td>Number of shares distributed to the public &gt; 10,000</td>
<td>Created in 1997 – closed in 2003</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Free float &gt; 25%</td>
<td>3 years of existence</td>
<td>Shares/’ equity &gt; EUR 1.5 millions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td>At least 2 designated sponsors</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Financial reporting in accordance with German standards</td>
<td>Financial reporting in accordance with German standards</td>
<td>Insistence &gt; 100,000 shares</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Prime Standard</td>
<td></td>
<td>Insistence &gt; EUR 250,000 in nominal value</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Same as General Standard</td>
<td>Expected market value &gt; EUR 5 millions</td>
<td>Capital increase &gt; 20%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Financial reporting in accordance with U.S. GAAP and IFRS</td>
<td>Free float &gt; 20%</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Greece</th>
<th>Athens Stock Exchange (ASE)</th>
<th>ASE Capital Market Commission (CMC) for firms not complying age requirements</th>
<th>Main Market</th>
<th>Parallel Market</th>
<th>New Market (NEO/AD)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Shares/’ equity &gt; GRD 4 billions (EUR 11.74 billions)</td>
<td>25% of the equity should be distributed to at least 2,000 shareholders owning less than 2% of the capital</td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Created in 1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public &gt; 25%</td>
<td>20% of the equity should be distributed to at least 1,000 shareholders</td>
<td>Filed audited accounts over a period of 2 years prior to the date of the listing</td>
<td>New technology firms</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td>Capital increase &gt; 80% of offered shares</td>
<td></td>
<td>Insistence &gt; 100,000 shares</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ordinary</td>
<td>Insistence &gt; GRD 200 millions (EUR 587,000)</td>
<td></td>
<td>At least 150 shareholders must own less than 1% of the capital</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Market capitalisation &gt; EUR 200 million and &lt; EUR 600 million</td>
<td>At least 150 shareholders must own less than 2% of the capital</td>
<td></td>
<td>Capital increase &gt; 80% of offered shares</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Number of shares distributed to the public &gt; 25%</td>
<td>Filed audited accounts over a period of 2 year prior to the date of the listing</td>
<td></td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3 years of accounting records</td>
<td>Lock-up period for shareholders owning &gt; 80% of the shares during 1 year and 50% during 2 year</td>
<td></td>
<td>At least 1 market maker</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td></td>
<td></td>
<td></td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Italy</th>
<th>Borsa Italiana</th>
<th>CONSOB and Borsa Italiana</th>
<th>Borsa (MTA)</th>
<th>Mercato Expansi</th>
<th>Nuovo Mercato</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Blue Chips</td>
<td>Market capitalisation &gt; EUR 800 million</td>
<td>High-growth companies</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Market capitalisation &gt; EUR 800 million</td>
<td>Number of shares distributed to the public &gt; 10%</td>
<td>Capitalisation &gt; EUR 3 million</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 years of accounting records</td>
<td>2 years of accounting records</td>
<td>Insistence &gt; 100,000 shares</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td>Insistence &gt; EUR 5 millions</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ordinary</td>
<td>Turnover &gt; EUR 750,000</td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Market capitalisation &gt; EUR 20 million and &lt; EUR 600 million</td>
<td>Last art earnings &gt; EUR 100,000</td>
<td>Number of shares distributed to the public &gt; 30%</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Number of shares distributed to the public &gt; 35% for newly listed companies (28% for transferred companies)</td>
<td>Financial debt / consolidated gross operating margin &lt; 4</td>
<td>Capital increase &gt; 50% of offered shares</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>3 years of accounting records</td>
<td></td>
<td>Lock-up period for pre-IPO shareholders and managers: 1 year applicable to 80% of the shares (2 years for start-up companies)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 1 year prior to the date of the listing</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Poland | Warsaw Stock Exchange (WSE) | Main market | Parallel Market | — |
|--------|-----------------------------|------------|----------------|——|
|        |                             | Total book value > PLN 65 millions | Total book value > PLN 22 millions | — |
|        |                             | Market capitalisation > PLN 40 millions | Market capitalisation > PLN 14 millions | — |
|        |                             | Free float > PLN 1 million | Free float > PLN 11 million | — |
|        |                             | < 25% or > 500,000 shares of value > PLN 70 millions | Free float > 10% or > 200,000 shares of value > PLN 35 million | — |

<table>
<thead>
<tr>
<th>Spain</th>
<th>BME</th>
<th>CNMV</th>
<th>Primer Mercado</th>
<th>Segundo Mercado</th>
<th>Nuevo Mercado</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shares/’ equity &gt; EUR 1.5 million excluding stakes &gt; 25% belonging to 2 shareholders</td>
<td>Shares/’ equity &gt; EUR 350,000</td>
<td>Operational since 2000</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>At least 100 shareholders must own a stake &gt; 25% of the capital</td>
<td>Public float &gt; 20%</td>
<td>Information not available</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Filed audited accounts over a period of 3 years prior to the date of the listing</td>
<td>Filed audited accounts over a period of 2 years prior to the date of the listing</td>
<td>—</td>
</tr>
</tbody>
</table>

**Tab. 6b.** Listing requirements on European regulated markets (after Gajewski, Gresse (2006)).
### Tab. 6c. Listing requirements on European regulated markets (after Gajewski, Gresse (2006)).

<table>
<thead>
<tr>
<th>Country</th>
<th>Exchange</th>
<th>Book-building institutional only</th>
<th>Book-building with public offer</th>
<th>Fixed-price offering</th>
<th>Auction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Austria</td>
<td>VSE</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Belgium</td>
<td>Euromext Brussels</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Finland</td>
<td>HSE</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>France</td>
<td>Euromext Paris</td>
<td>yes (placement)</td>
<td>yes</td>
<td>yes</td>
<td>Various types organised by the exchange (direct admission, minimum price offer, open price offer)</td>
</tr>
<tr>
<td>Germany</td>
<td>Deutsche Börse</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>not on stock</td>
</tr>
<tr>
<td>Greece</td>
<td>ASE</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Italy</td>
<td>Borsa Italiani</td>
<td>yes (with fixed price* and with open price**)</td>
<td>no</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td>Netherlands</td>
<td>Euromext Amsterdam</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Poland</td>
<td>WSE</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td>Portugal</td>
<td>Euromext Lisbon</td>
<td>yes</td>
<td>yes</td>
<td>yes (offer for sale)</td>
<td>yes (offer for sale)</td>
</tr>
<tr>
<td>Spain</td>
<td>BME</td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td>Sweden</td>
<td>OMX</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
</tr>
<tr>
<td>Switzerland</td>
<td>SWX</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>not on stock</td>
</tr>
<tr>
<td>Turkey</td>
<td>ISE</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes (sale on the ISE)</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>LSE</td>
<td>yes (placing)</td>
<td>yes (offer for sale at fixed price, offer for subscribers at fixed price)</td>
<td>yes</td>
<td>yes (offer for sale by tender offer, offer for subscription by tender offer, open offer)</td>
</tr>
</tbody>
</table>

* Before 1999, in the Italian book-building procedures, a fixed price was offered to institutions at the end of the marketing period prior to actual order submission. In 1999, this practice was abandoned in favor of the book-building with open price.
** Since 1999, book-building with open price has been the general practice in Italy. The final price is determined after collecting orders from institutions, so that they do not know at which price they will effectively buy the shares.
*** Since 1992, when Royal Decree 391/1992 was published.

### Tab. 7. IPO mechanisms by country (after Gajewski, Gresse (2006)).
Doidge, Karolyi, Stulz (2011) performed the research on the IPO and came up with the following observation: “Global IPOs are a way for firms to exploit the better institutions of foreign countries to have a successful or more profitable IPO.”

Tab. 8 shows the IPO activity in terms of IPO number for the top 25 countries around the world: 1990 to 2007 in Doidge, Karolyi, Stulz (2011).

<table>
<thead>
<tr>
<th>Country</th>
<th>All IPOs</th>
<th>Domestic IPOs</th>
<th>Global IPOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>6,126</td>
<td>4,931</td>
<td>1,195</td>
</tr>
<tr>
<td>India</td>
<td>4,867</td>
<td>4,777</td>
<td>90</td>
</tr>
<tr>
<td>Japan</td>
<td>2,234</td>
<td>2,130</td>
<td>104</td>
</tr>
<tr>
<td>Canada</td>
<td>2,225</td>
<td>2,020</td>
<td>205</td>
</tr>
<tr>
<td>China</td>
<td>1,764</td>
<td>1,300</td>
<td>464</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>1,650</td>
<td>1,356</td>
<td>294</td>
</tr>
<tr>
<td>Australia</td>
<td>1,558</td>
<td>1,400</td>
<td>158</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>822</td>
<td>541</td>
<td>281</td>
</tr>
<tr>
<td>Taiwan</td>
<td>822</td>
<td>808</td>
<td>14</td>
</tr>
<tr>
<td>South Korea</td>
<td>779</td>
<td>752</td>
<td>27</td>
</tr>
<tr>
<td>France</td>
<td>750</td>
<td>503</td>
<td>247</td>
</tr>
<tr>
<td>Malaysia</td>
<td>722</td>
<td>697</td>
<td>25</td>
</tr>
<tr>
<td>Germany</td>
<td>573</td>
<td>288</td>
<td>285</td>
</tr>
<tr>
<td>Singapore</td>
<td>488</td>
<td>404</td>
<td>84</td>
</tr>
<tr>
<td>Thailand</td>
<td>408</td>
<td>333</td>
<td>75</td>
</tr>
<tr>
<td>Indonesia</td>
<td>273</td>
<td>189</td>
<td>84</td>
</tr>
<tr>
<td>Pakistan</td>
<td>249</td>
<td>247</td>
<td>2</td>
</tr>
<tr>
<td>Italy</td>
<td>244</td>
<td>54</td>
<td>190</td>
</tr>
<tr>
<td>Greece</td>
<td>185</td>
<td>148</td>
<td>37</td>
</tr>
<tr>
<td>Norway</td>
<td>179</td>
<td>123</td>
<td>56</td>
</tr>
<tr>
<td>Poland</td>
<td>175</td>
<td>133</td>
<td>42</td>
</tr>
<tr>
<td>Israel</td>
<td>155</td>
<td>13</td>
<td>142</td>
</tr>
<tr>
<td>Sweden</td>
<td>143</td>
<td>53</td>
<td>90</td>
</tr>
<tr>
<td>Brazil</td>
<td>128</td>
<td>60</td>
<td>68</td>
</tr>
<tr>
<td>Netherlands</td>
<td>120</td>
<td>26</td>
<td>94</td>
</tr>
<tr>
<td><strong>Total: top 25</strong></td>
<td><strong>27,639</strong></td>
<td><strong>25,286</strong></td>
<td><strong>4,353</strong></td>
</tr>
<tr>
<td><strong>Rest of world</strong></td>
<td><strong>1722</strong></td>
<td><strong>836</strong></td>
<td><strong>886</strong></td>
</tr>
<tr>
<td><strong>Total: all countries</strong></td>
<td><strong>29,361</strong></td>
<td><strong>24,122</strong></td>
<td><strong>5,239</strong></td>
</tr>
</tbody>
</table>

**Tab. 8. IPO activity in terms of IPO number for the top 25 countries around the world: 1990 to 2007 (after Doidge, Karolyi, Stulz (2011)).**
Tab. 9 shows the IPO activity in terms of IPO value for the top 25 countries around the world: 1990 to 2007 in Doidge, Karolyi, Stulz (2011).

<table>
<thead>
<tr>
<th>Country</th>
<th>All IPOs</th>
<th>Domestic IPOs</th>
<th>Global IPOs: total</th>
<th>Global IPOs: global only</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>$647.7</td>
<td>$352.3</td>
<td>$295.4</td>
<td>$61.6</td>
</tr>
<tr>
<td>China</td>
<td>$254.6</td>
<td>$110.1</td>
<td>$144.5</td>
<td>$133.1</td>
</tr>
<tr>
<td>Japan</td>
<td>$204.1</td>
<td>$135.2</td>
<td>$68.9</td>
<td>$22.1</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>$196.3</td>
<td>$77.1</td>
<td>$119.2</td>
<td>$68.9</td>
</tr>
<tr>
<td>France</td>
<td>$122.3</td>
<td>$9.7</td>
<td>$112.6</td>
<td>$54.3</td>
</tr>
<tr>
<td>Germany</td>
<td>$106.6</td>
<td>$27.6</td>
<td>$79.0</td>
<td>$45.0</td>
</tr>
<tr>
<td>Italy</td>
<td>$84.2</td>
<td>$9.7</td>
<td>$74.5</td>
<td>$32.4</td>
</tr>
<tr>
<td>Australia</td>
<td>$76.3</td>
<td>$34.4</td>
<td>$41.9</td>
<td>$18.8</td>
</tr>
<tr>
<td>Canada</td>
<td>$68.6</td>
<td>$47.7</td>
<td>$20.9</td>
<td>$15.2</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>$63.6</td>
<td>$12.9</td>
<td>$50.7</td>
<td>$43.6</td>
</tr>
<tr>
<td>South Korea</td>
<td>$58.2</td>
<td>$46.1</td>
<td>$12.1</td>
<td>$10.5</td>
</tr>
<tr>
<td>Russian Fed</td>
<td>$43.6</td>
<td>$13.9</td>
<td>$29.7</td>
<td>$29.7</td>
</tr>
<tr>
<td>Spain</td>
<td>$41.5</td>
<td>$3.2</td>
<td>$38.3</td>
<td>$18.4</td>
</tr>
<tr>
<td>Netherlands</td>
<td>$39.6</td>
<td>$4.1</td>
<td>$35.5</td>
<td>$28.2</td>
</tr>
<tr>
<td>Brazil</td>
<td>$39.3</td>
<td>$14.9</td>
<td>$24.4</td>
<td>$23.3</td>
</tr>
<tr>
<td>Switzerland</td>
<td>$37.1</td>
<td>$9.6</td>
<td>$27.5</td>
<td>$20.2</td>
</tr>
<tr>
<td>Sweden</td>
<td>$33.9</td>
<td>$3.4</td>
<td>$30.5</td>
<td>$17.3</td>
</tr>
<tr>
<td>India</td>
<td>$32.2</td>
<td>$17.8</td>
<td>$14.4</td>
<td>$12.5</td>
</tr>
<tr>
<td>Taiwan</td>
<td>$27.1</td>
<td>$25.5</td>
<td>$1.6</td>
<td>$1.5</td>
</tr>
<tr>
<td>Bermuda</td>
<td>$26.5</td>
<td>$0.1</td>
<td>$26.4</td>
<td>$26.4</td>
</tr>
<tr>
<td>Thailand</td>
<td>$22.9</td>
<td>$11.0</td>
<td>$11.9</td>
<td>$6.5</td>
</tr>
<tr>
<td>Singapore</td>
<td>$20.3</td>
<td>$7.9</td>
<td>$12.4</td>
<td>$10.5</td>
</tr>
<tr>
<td>Indonesia</td>
<td>$20.3</td>
<td>$5.0</td>
<td>$15.3</td>
<td>$9.9</td>
</tr>
<tr>
<td>Mexico</td>
<td>$19.6</td>
<td>$7.0</td>
<td>$12.5</td>
<td>$10.2</td>
</tr>
<tr>
<td>Norway</td>
<td>$18.6</td>
<td>$6.7</td>
<td>$11.9</td>
<td>$8.6</td>
</tr>
<tr>
<td><strong>Total: top 25</strong></td>
<td><strong>$2,305.1</strong></td>
<td><strong>$992.8</strong></td>
<td><strong>$1312.3</strong></td>
<td><strong>$728.7</strong></td>
</tr>
<tr>
<td><strong>Rest of world</strong></td>
<td><strong>$249.5</strong></td>
<td><strong>$84.7</strong></td>
<td><strong>$164.8</strong></td>
<td><strong>$129.4</strong></td>
</tr>
<tr>
<td><strong>Total: all countries</strong></td>
<td><strong>$2,554.6</strong></td>
<td><strong>$1,077.5</strong></td>
<td><strong>$1,477.1</strong></td>
<td><strong>$858.1</strong></td>
</tr>
</tbody>
</table>

**Tab. 9. IPO activity in terms of IPO value for the top 25 countries around the world: 1990 to 2007 (after Doidge, Karolyi, Stulz (2011)).**
Fig. 2 shows the total IPO activity: 1990 to 2007 in Doidge, Karolyi, Stulz (2011).

![Panel a. IPO counts.](image)

![Panel b. IPO proceeds.](image)

**Fig. 2.** Total IPO activity: 1990 to 2007 (after Doidge, Karolyi, Stulz (2011)).

Let us add a few words about the online IPO by reviewing the various authors’ opinions on the subject of research interest.

*Bourjade (2003, 2008)* writes: “More recently, Open IPO, a new, web-based underwriter has proposed to sell shares using a uniform price auction. The extensive use of this mechanism is due to the backing of leading economists and policy makers, who have asserted that uniform price auctions are the most efficient multi-unit auction format. Their conclusions are based on the generalization of the single-unit auctions literature to multi-unit auctions.” *Bourjade (2003, 2008)* writes: “More recently, Open IPO, a new, web-based underwriter has proposed to sell shares using a uniform price auction. The extensive use of this mechanism is due to the backing of leading economists and policy makers, who have asserted that uniform price auctions are the most efficient multi-unit auction format. Their conclusions are based on the generalization of the single-unit auctions literature to multi-unit auctions.”
2008) describes the IPO valuation process: “After all bids are submitted, the seller and the underwriter meet and set the offering price subject to the seller’s preferred ownership structure which usually involves pro-rata rationing. They provide empirical evidence that secondary market liquidity and ownership dispersion are fundamental in determining the offering price.” Bourjade (2003, 2008) turns to the Open IPO statements to describe the factors, which may impact the public offering price: “Depending on the outcome of negotiations between the underwriters and us, the public offering price may be lower, but will not be higher, than the clearing price. The bids received in the auction and the resulting clearing price are the principal factors used to determine the public offering price of the stock that will be sold in this offering. The public offering price may be lower than the clearing price depending on a number of additional factors, including general market trends or conditions, the underwriters’ assessment of our management, operating results, capital structure and business potential and the demand and price of similar securities of comparable companies. The underwriters and us may also agree to a public offering price that is lower than the clearing price in order to facilitate a wider distribution of the stock to be sold in the offering.”

Lemmens (2004, 2007) explains: “The most important advantage of an IPO is first of all the possibility to raise new capital (“primary offering”). This money can be used to finance the growth of the existing activities or to diversify the activities (new investments or acquisitions). An increase in capital reduces the proportion of the debts compared to the balance total, allowing the firm to borrow more easily in the future and at a lower rate. Another advantage of an IPO is that it facilitates the expansion process. When acquiring another company, the shareholders of this company will prefer stock in your company instead of money. Such a transaction is therefore more easily for a public company, as the value of this stock is known for all economic agents. Other advantages of IPOs are the increased publicity (more attention from the press, better image,….) and the possibility to award employees with options in order to motivate them.”

Lemmens (2004, 2007) writes: “The largest amounts of online capital raised in the future will be done with IPOs. There are several advantages of online IPOs compared to traditional IPOs: a reduction in costs, an increased availability of capital, a fair allocation of the shares and more flexibility for investors. The disadvantages are parallel with online DPOs: less marketing, possible lack of liquidity, problems of adverse selection, regulatory problems, problems concerning the bidding strategy and possibly unrealistically high stock price. Of these disadvantages, the lack of confidence of investors is the most important one. Investors will need to learn to trust online investment bankers before the number of online IPOs starts growing significantly.”
Tab. 10 shows the stock performance in an average US IPO, and Fig. 3 demonstrates the performance of Google stock in the first week of trading in Hild (2008).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of IPOs</th>
<th>No. of IPOs Doubling in Value</th>
<th>Average First-Day Return</th>
<th>Money Left on the Table (millions)</th>
<th>Gross Proceeds</th>
<th>Average Percentage of Firm Sold</th>
<th>Percentage of Tech Stocks</th>
<th>Percentage of IPOs with EPS&lt;0</th>
<th>Average First-Day Return for EPS&lt;0</th>
<th>Average First-Day Return for EPS&gt;0</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980–89</td>
<td>1,992</td>
<td>9</td>
<td>7.4 percent</td>
<td>$5,409</td>
<td>$82,476</td>
<td>30.5 percent</td>
<td>26 percent</td>
<td>19 percent</td>
<td>9.1 percent</td>
<td>6.8 percent</td>
</tr>
<tr>
<td>1990–94</td>
<td>1,532</td>
<td>6</td>
<td>11.2 percent</td>
<td>$9,954</td>
<td>$101,652</td>
<td>34.7 percent</td>
<td>23 percent</td>
<td>26 percent</td>
<td>16.8 percent</td>
<td>11.4 percent</td>
</tr>
<tr>
<td>1995–98</td>
<td>1,732</td>
<td>34</td>
<td>18.1 percent</td>
<td>$12,436</td>
<td>$140,613</td>
<td>32.0 percent</td>
<td>37 percent</td>
<td>37 percent</td>
<td>15.2 percent</td>
<td>17.4 percent</td>
</tr>
<tr>
<td>1999–2000</td>
<td>803</td>
<td>182</td>
<td>65.0 percent</td>
<td>$65,625</td>
<td>$129,363</td>
<td>22.4 percent</td>
<td>72 percent</td>
<td>79 percent</td>
<td>72.0 percent</td>
<td>43.5 percent</td>
</tr>
<tr>
<td>2001</td>
<td>80</td>
<td>0</td>
<td>14.0 percent</td>
<td>$2,573</td>
<td>$34,344</td>
<td>26.3 percent</td>
<td>29 percent</td>
<td>49 percent</td>
<td>13.3 percent</td>
<td>11.6 percent</td>
</tr>
<tr>
<td>1980–2001</td>
<td>6,219</td>
<td>231</td>
<td>18.8 percent</td>
<td>$106,397</td>
<td>$488,448</td>
<td>29.0 percent</td>
<td>34.5 percent</td>
<td>34 percent</td>
<td>31.4 percent</td>
<td>12.5 percent</td>
</tr>
</tbody>
</table>

**Tab. 10.** Stock performance in average US IPO (after Hild (2008)).

![Graph showing price and volume traded over time](image)

**Fig. 3.** Performance of Google stock in first week of trading (after Hild (2008)).
Valuation of initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

Cogliati, Paleari, Vismara (2010) performed the original research on the valuation of the IPOs: “There exist two approaches to firm valuation. In direct valuation, the firm’s value is estimated from its fundamentals; in relative valuation, it is estimated from the prices of comparable firms. In both approaches, the valuation faces specific difficulties related to the IPO timing decision. For example, firms may schedule their IPO in order to take advantage of “windows of opportunity”. These are periods of market buoyancy during which other companies in the same industry tend to be overvalued Loughran and Ritter (1995). Thus, investors risk over-paying for stock in firms priced using relative valuation methodologies. Besides, firms may decide to go public when they are able to display positive growth opportunities, and thus induce optimistic valuations. To do this, firms may time their IPO for when transitory earnings are high, since investors have difficulty distinguishing between transitory and permanent earnings (this is the signal-jamming explanation given by Stein (1989)). Finally, managers may window-dress accounting numbers to make their firms look better Teoh et al. (1998). Again, investors risk over-valuation of such firms.”

Cogliati, Paleari, Vismara (2010) state: “We find that the Discounted Cash Flow (DCF) is the model of direct valuation that is most widely used to price IPOs. Specifically, we investigate a sample of 184 IPOs priced using a DCF model to address a basic research question: at what rates were the IPO firms expected to grow by their underwriters?”

Cogliati, Paleari, Vismara (2010) propose an equation to value the IPO with the DCF model:

\[ EV_{IPO} = FCFF_{IPO} \left[ \sum_{i=1}^{T} \left( \frac{1 + g_{1}}{1 + WACC} \right)^{i} + \left( \frac{1 + g_{1}}{1 + WACC} \right)^{T} \sum_{i=1}^{\infty} \left( \frac{1 + g_{2}}{1 + WACC} \right)^{i} \right] \]

Cogliati, Paleari, Vismara (2010) suggest an equation to estimate the expected growth rates, implied in IPO prices:

\[ P_{IPO} = \frac{FCFF_{IPO}}{WACC \cdot NSH_{pre}} \left[ \frac{(1 + g_{1}) \cdot (1 + WACC)^{T} - 1 + (1 + g_{2}) \cdot (1 + g_{1})^{T-1}}{(1 + WACC)^{T}} \right] - \frac{D_{IPO}}{NSH_{pre}} \]
Cogliati, Paleari, Vismara (2010) make a remark: “Estimation errors (i.e., the difference between implied and realized growth) increase with IPO firms’ leverage, pre-IPO earnings, and underpricing, while decrease with age, size, and book-to-market ratios.”

Tab. 11 shows the notation and definition of the variables in Cogliati, Paleari, Vismara (2010).

<table>
<thead>
<tr>
<th>Notation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>$E_V$</td>
<td>Enterprise Value at time $t$</td>
</tr>
<tr>
<td>$E_t$</td>
<td>Equity value at time $t$</td>
</tr>
<tr>
<td>$D_t$</td>
<td>Value of outstanding Debt at time $t$</td>
</tr>
<tr>
<td>$FCFF_{t}$</td>
<td>Free Cash Flows to the Firm at time $t$</td>
</tr>
<tr>
<td>$E_t[FCFF_{t-i}]$</td>
<td>Expected Free Cash Flows to the Firm (estimated at time $t$ for time $t-i$)</td>
</tr>
<tr>
<td>$WACC$</td>
<td>Weighted Average Cost of Capital</td>
</tr>
<tr>
<td>$g_1$</td>
<td>Growth rate during the first stage (“extra growth”) of the DCF model</td>
</tr>
<tr>
<td>$g_2$</td>
<td>Growth rate during the second stage (“stable growth”) of the DCF model</td>
</tr>
<tr>
<td>$T$</td>
<td>Duration of the first stage of the DCF model (years)</td>
</tr>
<tr>
<td>$FCFF_{IPO}$</td>
<td>Free Cash Flows to the Firm prior to the IPO, as reported in the prospectus</td>
</tr>
<tr>
<td>$EV_{IPO}$</td>
<td>Enterprise Value at IPO: $EV_{IPO} = E_{IPO} + D_{IPO} - CI_{IPO}$</td>
</tr>
<tr>
<td>$E_{IPO}$</td>
<td>Equity value at IPO price: $E_{IPO} = p_{IPO} \cdot (NSH_{pre} + NSH_{neo})$</td>
</tr>
<tr>
<td>$D_{IPO}$</td>
<td>Value of outstanding Debt before the IPO, as reported in the prospectus</td>
</tr>
<tr>
<td>$CI_{IPO}$</td>
<td>Cash Inflow at the IPO due to the subscription of newly issued shares: $CI_{IPO} = p_{IPO} \cdot NSH_{pre}$</td>
</tr>
<tr>
<td>$NSH_{pre}$</td>
<td>Number of shares existing prior to the IPO</td>
</tr>
<tr>
<td>$NSH_{neo}$</td>
<td>Number of newly issued shares (primary offer)</td>
</tr>
<tr>
<td>$p_{IPO}$</td>
<td>Offer price: $p_{IPO} = (EV_{IPO} - D_{IPO}) / NSH_{pre}$</td>
</tr>
<tr>
<td>$v_{IPO}$</td>
<td>Fair price: $v_{IPO} = (EV_{IPO}/D_{IPO}) / NSH_{pre}$</td>
</tr>
<tr>
<td>$EE_{I,j}$</td>
<td>Estimation Error for firm $j$ in year $t$: $EE_{I,j} = (E_{I,j}[FCFF_{I,j}] - FCFF_{I,j}) / E_{I,j}[FCFF_{I,j}]$</td>
</tr>
<tr>
<td>O.V.I.</td>
<td>Over-Valuation Index (O V I): $(p_{IPO} - v_{IPO}) / p_{IPO}$</td>
</tr>
</tbody>
</table>

Panel A: Notation used in the reverse-engineered DCF model

Panel B: Definition of the variables used in the empirical analysis

Tab. 11. Notation and definition of variables (after Cogliati, Paleari, Vismara (2010)).

Underpricing of initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

Hopp, Dreherdo (2007) define the underpricing of company’s equity as: “Underpricing relates to the fact that shares traded publicly for the first time substantially jump in price on the first trading day. Thus, investors are willing to pay higher prices for shares when trading begins than investors paid for their share allocation from the investment bank that accompanied the prospective IPO. As substantial amounts of money are left on the table when personal shares are sold too low and the prices for retained shares are diluted, underpricing is costly to firm owners (Ljungqvist (2006)). The academic literature points out several reasons for the prevailing existence of underpricing in capital markets. According to Ljungqvist (2006), IPO underpricing can in general be attributed to asymmetric information, institutional factors, control considerations and behavioral aspects. Ritter (1984) argues that underpricing is related to the ex ante uncertainty about the future value of a firm going public. Hence, the level of underpricing can be regarded as a compensation for the risk bearing of investors.”

Tab. 12 shows the variations of IPOs and IPO underpricing in Hopp, Dreherdo (2007).
Tab. 12. Cross country variation of IPOs and IPO underpricing (after Hopp, Dreherdo (2007)).

Gajewski, Gresse (2006) write: “Initial underpricing is positively linked to information asymmetry in the after-market. It produces higher turnover immediately after the IPO but has no effect on trading volumes after the first year of trading, so that this liquidity effect cannot be put down to the ownership structure but is more likely attributable to the interest underpriced stocks generate.” Gajewski, Gresse (2006) explain: “Initial performance can be measured by the difference between the post-listing equilibrium price (EP) and the final offering price (OP) divided by the offering price:

\[ U = \frac{EP - OP}{OP} = \frac{EP}{OP} - 1, \]

\[ U = \ln \left( \frac{EP}{OP} \right). \]

A main problem is the choice of the equilibrium price \( EP \), i.e. the trading price matching the offer and the demand for the shares after the IPO. When the market is sufficiently liquid, \( EP \) generally corresponds to the first-day closing price. In other cases, the equilibrium may be obtained a couple of days after the IPO. For that reasons, some authors measure initial returns
over a five day or one week horizon (Table 9). The raw initial return $U$ can be considered a measure of underpricing, assuming that the normal return under efficiency would be 0 and that the equity risk is equivalent to the market risk. Other methods relax these assumptions and adjust raw returns.”

Gajewski, Gresse (2006) note: “Three adjustment methods are used in the literature:

1) The initial return adjusted for a market index return

$$U_m = \frac{EP - OP}{OP} - \frac{I_1 - I_0}{I_0} = \frac{EP}{OP} - \frac{I_1}{I_0},$$

$$U_m = \ln \left( \frac{EP}{OP} \right) - \ln \left( \frac{I_1}{I_0} \right),$$

where $I_I$ is the market index closing price on the first trading day, and $I_0$ is the index closing value the day before;

2) The initial return adjusted for systematic risk,

$$U_s = \frac{EP - OP}{OP} - \beta \frac{I_1 - I_0}{I_0},$$

where $\beta$ is the systematic risk;

3) The raw initial return adjusted for the return of a control portfolio Ritter (1991) and Affleck-Graves et al. (1993)

$$U_p = \frac{EP - OP}{OP} - R_p,$$

where $R_p$ is the return of a reference portfolio.

Moreover, some papers Keloharju (1993); Husson and Jacquillat (1990) calculate the return that would be obtained by an uninformed investor participating in all the IPOs. Considering that the market movements are too small to affect the initial returns significantly, most studies measure IPO underpricing with raw returns and select the closing price at the end of the first day of quotation as the equilibrium price. Adjusted returns are preferred when the delay between the IPO date and the determination of the first equilibrium price is too long Périer (1996). The most widely utilized adjusted measure is $U_m$, which implicitly standardizes systematic risk to 1. As pointed out by Kooli (2000), the limits of the second model ($U_s$) lie in the difficult and biased estimation of beta.”
Toniato (2007) explains: “The initial post-IPO abnormal returns will be computed as in Aggarwal et al. (1993). For this purpose firstly, the total return on each of the studied companies’ stock \( (R_{st}) \) and on their benchmarks \( (R_{bt}) \) are estimated for the period from the offer price until the \( t^{th} \) day of trading as

\[
R_{st} = \left( \frac{P_{st}}{P_{so}} \right) - 1,
\]

\[
R_{bt} = \left( \frac{P_{bt}}{P_{b0}} \right) - 1,
\]

where \( P_{st} \) and \( P_{bt} \) are the closing market price of each of the companies’ stock and of the benchmarks on the \( t^{th} \) day of trading. \( P_{so} \) and \( P_{b0} \) are the offer price at which the company’s shares floated in the market and the opening market price of the benchmark on the day of the IPO respectively. From these two returns the market adjusted abnormal return from the opening price until the end of the \( t^{th} \) day of trading is computed, for all clinical study companies, as

\[
MAAR_t = 100 \times \left\{ \frac{1 + R_{st}}{1 + R_{bt}} \right\} - 1.
\]

Khurshed and Mudambi (2002) draw attention to the fact that the use of \( MAAR \) as an abnormal return measure assumes that the systematic risk of the IPO company is the same as that of the benchmark. Therefore, upward-biased \( MAARs \) might be generated when the assumption is not satisfied. Nonetheless, Khurshed and Mudambi (2002) also indicate that this matter is unlikely to affect the essence of the performance results.”

The underpricing variable in the IPO process has also been defined in Pennacchio (2013)

\[
Underpricing = \left[ \frac{P - P_{IPO}}{P_{IPO}} \right] \times 100,
\]

where \( P \) is the closing price in the first day of trading, and \( P_{IPO} \) is the offer price of the stocks.

Ritter (2006) defines the underpricing and the money on the table as:

\[
Underpricing = 100\% \times \text{(closing price-offer price)/offer price},
\]

\[
\text{Money on the table} = \text{number of shares sold(closing price-offer price)}.
\]
Loughran, Ritter (2004) write: “The reasons that IPOs are underpriced vary, depending on the environment. In the 1980s, it is conceivable that the winner’s curse problem and dynamic information acquisition were the main explanations for underpricing that averaged 7% in the US. During the internet bubble, we think that these were not the main reasons for underpricing. Instead, analyst coverage and side payments to CEOs and venture capitalists became of significant importance.”

Discussing the **analyst coverage problem**, Loughran, Ritter (2004) continue to explain: “Underwriters, as intermediaries, advise the issuer on pricing the issue, both at the time of issuing a preliminary prospectus that includes a file price range, and at the pricing meeting when the final offer price is set. If underwriters receive compensation from both the issuer (the gross spread) and investors, they have an incentive to recommend a lower offer price than if the compensation was merely the gross spread.” The **analyst coverage problem** has been found to exist in Boissin (2012): “We find that investors and market participants pay attention to analyst coverage when IPOs have large underwriting syndicates and are highly underpriced.”

Considering the **CEOs and venture capitalists side payments problem**, Loughran, Ritter (2004) propose a spinning hypothesis of IPO underpricing: “We introduce a new agency explanation for IPO underpricing, the spinning hypothesis, which is based on a conflict of interest between decision-makers and other pre-IPO shareholders. It posits that decision-makers are willing to hire underwriters with a history of underpricing because the decision-makers receive side payments. The decision-makers are the individuals who choose the managing underwriters, especially the lead underwriter, for an IPO. These decision-makers are the general partners of the lead venture capital firm (if a firm is financed with venture capital money) and the top managers of the issuing firm. The other pre-issue shareholders are the limited partners of venture capital firms and other minority shareholders.”

Fig. 4 demonstrates the number of IPOs (bars) and average first-day returns (diamonds) by calendar year in Loughran, Ritter (2004).

Fig. 5 depicts the average first-day returns by age of the firm at the time of IPO in Loughran, Ritter (2004).

Tab. 13 provides some information on a number of IPOs, first day returns, number of managing underwriters, amount of money left on the table, valuation levels, and sales by year (means) in Loughran, Ritter (2004).

Tab. 14 shows the average first-day returns on the IPOs categorized by proceeds, assets, sales, age, industry, VC-backing, share overhang, and underwriter prestige in Loughran, Ritter (2004).
**Fig. 4.** Number of IPOs (bars) and average first-day returns (diamonds) by calendar year (after Loughran, Ritter (2004)).

**Fig. 5.** Average first-day returns by age of firm at time of IPO (after Loughran, Ritter (2004)).
Tab. 13. Number of IPOs, first day returns, number of managing underwriters, amount of money left on the table, valuation levels, and sales by year (means) (after Loughran, Ritter (2004)).

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of IPOs</th>
<th>First-Day Return</th>
<th>Number of Managing Underwriters</th>
<th>Money on the Table (T)</th>
<th>Offer Price</th>
<th>Market Price</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980</td>
<td>70</td>
<td>14.5%</td>
<td>1.4</td>
<td>$5.6</td>
<td>$145</td>
<td>$181</td>
<td>$77</td>
</tr>
<tr>
<td>1981</td>
<td>191</td>
<td>5.8%</td>
<td>1.3</td>
<td>$1.4</td>
<td>$102</td>
<td>$109</td>
<td>$55</td>
</tr>
<tr>
<td>1982</td>
<td>77</td>
<td>11.4%</td>
<td>1.4</td>
<td>$3.3</td>
<td>$111</td>
<td>$126</td>
<td>$41</td>
</tr>
<tr>
<td>1983</td>
<td>442</td>
<td>10.1%</td>
<td>1.5</td>
<td>$3.5</td>
<td>$151</td>
<td>$165</td>
<td>$92</td>
</tr>
<tr>
<td>1984</td>
<td>172</td>
<td>3.6%</td>
<td>1.5</td>
<td>$0.5</td>
<td>$89</td>
<td>$91</td>
<td>$84</td>
</tr>
<tr>
<td>1985</td>
<td>179</td>
<td>6.3%</td>
<td>1.5</td>
<td>$2.0</td>
<td>$188</td>
<td>$194</td>
<td>$202</td>
</tr>
<tr>
<td>1986</td>
<td>378</td>
<td>6.3%</td>
<td>1.5</td>
<td>$2.9</td>
<td>$182</td>
<td>$194</td>
<td>$171</td>
</tr>
<tr>
<td>1987</td>
<td>271</td>
<td>6.9%</td>
<td>1.8</td>
<td>$3.9</td>
<td>$214</td>
<td>$224</td>
<td>$248</td>
</tr>
<tr>
<td>1988</td>
<td>97</td>
<td>5.4%</td>
<td>1.7</td>
<td>$2.0</td>
<td>$306</td>
<td>$315</td>
<td>$300</td>
</tr>
<tr>
<td>1989</td>
<td>105</td>
<td>8.1%</td>
<td>1.6</td>
<td>$3.3</td>
<td>$229</td>
<td>$245</td>
<td>$241</td>
</tr>
<tr>
<td>1990</td>
<td>104</td>
<td>10.8%</td>
<td>1.9</td>
<td>$4.1</td>
<td>$206</td>
<td>$225</td>
<td>$265</td>
</tr>
<tr>
<td>1991</td>
<td>274</td>
<td>12.9%</td>
<td>2.0</td>
<td>$6.6</td>
<td>$211</td>
<td>$256</td>
<td>$237</td>
</tr>
<tr>
<td>1992</td>
<td>385</td>
<td>10.2%</td>
<td>2.0</td>
<td>$5.8</td>
<td>$217</td>
<td>$237</td>
<td>$222</td>
</tr>
<tr>
<td>1993</td>
<td>484</td>
<td>12.8%</td>
<td>2.1</td>
<td>$8.4</td>
<td>$269</td>
<td>$304</td>
<td>$263</td>
</tr>
<tr>
<td>1994</td>
<td>387</td>
<td>9.8%</td>
<td>2.0</td>
<td>$4.5</td>
<td>$179</td>
<td>$193</td>
<td>$294</td>
</tr>
<tr>
<td>1995</td>
<td>434</td>
<td>21.5%</td>
<td>2.3</td>
<td>$121</td>
<td>$268</td>
<td>$329</td>
<td>$211</td>
</tr>
<tr>
<td>1996</td>
<td>623</td>
<td>16.7%</td>
<td>2.4</td>
<td>$12.3</td>
<td>$330</td>
<td>$392</td>
<td>$160</td>
</tr>
<tr>
<td>1997</td>
<td>457</td>
<td>14.0%</td>
<td>2.5</td>
<td>$11.3</td>
<td>$287</td>
<td>$334</td>
<td>$181</td>
</tr>
<tr>
<td>1998</td>
<td>268</td>
<td>22.2%</td>
<td>2.9</td>
<td>$21.1</td>
<td>$540</td>
<td>$652</td>
<td>$332</td>
</tr>
<tr>
<td>1999</td>
<td>457</td>
<td>71.7%</td>
<td>3.4</td>
<td>$86.2</td>
<td>$890</td>
<td>$1,519</td>
<td>$368</td>
</tr>
<tr>
<td>2000</td>
<td>346</td>
<td>56.1%</td>
<td>3.7</td>
<td>$82.8</td>
<td>$963</td>
<td>$1,635</td>
<td>$270</td>
</tr>
<tr>
<td>2001</td>
<td>80</td>
<td>13.5%</td>
<td>3.4</td>
<td>$39.9</td>
<td>$208</td>
<td>$229</td>
<td>$210</td>
</tr>
<tr>
<td>2002</td>
<td>67</td>
<td>13.9%</td>
<td>4.7</td>
<td>$17.3</td>
<td>$221</td>
<td>$413</td>
<td>$137</td>
</tr>
<tr>
<td>2003</td>
<td>63</td>
<td>12.2%</td>
<td>4.0</td>
<td>$16.0</td>
<td>$575</td>
<td>$645</td>
<td>$380</td>
</tr>
<tr>
<td>1980-1989</td>
<td>1,982</td>
<td>7.3%</td>
<td>1.5</td>
<td>$2.8</td>
<td>$170</td>
<td>$181</td>
<td>$149</td>
</tr>
<tr>
<td>1990-1998</td>
<td>3,396</td>
<td>14.8%</td>
<td>2.3</td>
<td>$10.9</td>
<td>$281</td>
<td>$325</td>
<td>$222</td>
</tr>
<tr>
<td>1999-2000</td>
<td>803</td>
<td>65.0%</td>
<td>3.6</td>
<td>$847</td>
<td>$950</td>
<td>$1,569</td>
<td>$326</td>
</tr>
<tr>
<td>2001-2003</td>
<td>210</td>
<td>11.7%</td>
<td>4.4</td>
<td>$221</td>
<td>$1,352</td>
<td>$1,442</td>
<td>$248</td>
</tr>
<tr>
<td>Total</td>
<td>6,391</td>
<td>18.7%</td>
<td>2.3</td>
<td>$17.5</td>
<td>$361</td>
<td>$474</td>
<td>$248</td>
</tr>
</tbody>
</table>

Tab. 14. Average first-day returns on IPOs categorized by proceeds, assets, sales, age, industry, VC-backing, share overhang, and underwriter prestige (after Loughran, Ritter (2004)).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Small</td>
<td>7.4%</td>
<td>12.1%</td>
<td>32.7%</td>
<td>12.4%</td>
</tr>
<tr>
<td>Large</td>
<td>7.3%</td>
<td>17.0%</td>
<td>78.1%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Assets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small</td>
<td>9.0%</td>
<td>16.8%</td>
<td>71.0%</td>
<td>12.0%</td>
</tr>
<tr>
<td>Large</td>
<td>4.5%</td>
<td>13.1%</td>
<td>57.2%</td>
<td>11.6%</td>
</tr>
<tr>
<td>Sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low</td>
<td>9.2%</td>
<td>18.3%</td>
<td>73.0%</td>
<td>12.5%</td>
</tr>
<tr>
<td>High</td>
<td>5.2%</td>
<td>11.7%</td>
<td>46.6%</td>
<td>11.5%</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Young (0-7 years old)</td>
<td>9.0%</td>
<td>17.1%</td>
<td>75.2%</td>
<td>14.6%</td>
</tr>
<tr>
<td>Old (8 years and older)</td>
<td>5.8%</td>
<td>12.7%</td>
<td>45.2%</td>
<td>10.1%</td>
</tr>
<tr>
<td>Industry</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tech and internet-related</td>
<td>10.2%</td>
<td>22.2%</td>
<td>80.6%</td>
<td>16.4%</td>
</tr>
<tr>
<td>Non-technology</td>
<td>6.2%</td>
<td>11.3%</td>
<td>23.1%</td>
<td>9.8%</td>
</tr>
<tr>
<td>Segmented by source of shares offered</td>
<td>7.1%</td>
<td>13.8%</td>
<td>38.5%</td>
<td>9.4%</td>
</tr>
<tr>
<td>Exclusively sold by firm</td>
<td>7.7%</td>
<td>13.8%</td>
<td>69.4%</td>
<td>11.7%</td>
</tr>
<tr>
<td>Including secondary shares</td>
<td>7.1%</td>
<td>16.1%</td>
<td>40.4%</td>
<td>12.7%</td>
</tr>
<tr>
<td>Segmented by share overhang</td>
<td>7.8%</td>
<td>11.8%</td>
<td>261.6%</td>
<td>7.2%</td>
</tr>
<tr>
<td>High</td>
<td>7.0%</td>
<td>18.3%</td>
<td>72.7%</td>
<td>14.8%</td>
</tr>
<tr>
<td>Segmented by underwriter prestige</td>
<td>9.1%</td>
<td>12.9%</td>
<td>35.1%</td>
<td>12.2%</td>
</tr>
<tr>
<td>Low-prestige</td>
<td>5.1%</td>
<td>15.9%</td>
<td>20.9%</td>
<td>11.5%</td>
</tr>
<tr>
<td>High-prestige</td>
<td>7.8%</td>
<td>12.3%</td>
<td>75.0%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Rejected</td>
<td>20.5%</td>
<td>32.0%</td>
<td>777</td>
<td>24.3%</td>
</tr>
<tr>
<td>OP within range</td>
<td>7.8%</td>
<td>12.3%</td>
<td>75.0%</td>
<td>10.3%</td>
</tr>
<tr>
<td>Revised down</td>
<td>0.5%</td>
<td>4.3%</td>
<td>5.7%</td>
<td>4.5%</td>
</tr>
<tr>
<td>All</td>
<td>7.3%</td>
<td>14.8%</td>
<td>33.9%</td>
<td>11.7%</td>
</tr>
</tbody>
</table>
Tab. 15 shows the pre-issue CEO ownership in dollar values and percentage, 1996-2000; and Tab. 16 highlights the mean and median first-day returns, median age, sales, EPS, and share overhang, and industry representation vs the underwriter prestige in Loughran, Ritter (2004).

Tab. 15. Pre-issue CEO ownership in dollar values and percentage, 1996-2000
(after Loughran, Ritter (2004)).

<table>
<thead>
<tr>
<th>Year</th>
<th>Number of IPOs</th>
<th>Median Pre-Issue Number of CEO Shares</th>
<th>Median Offer Price</th>
<th>Median CEO Pre-Issue Dollar Value, Millions</th>
<th>Median Pre-Issue % CEO Ownership</th>
</tr>
</thead>
<tbody>
<tr>
<td>1996</td>
<td>623</td>
<td>723,591</td>
<td>$12.00</td>
<td>$8.68 m</td>
<td>10.4%</td>
</tr>
<tr>
<td>1997</td>
<td>457</td>
<td>880,401</td>
<td>$11.75</td>
<td>$10.34 m</td>
<td>12.8%</td>
</tr>
<tr>
<td>1998</td>
<td>268</td>
<td>1,188,677</td>
<td>$12.50</td>
<td>$14.86 m</td>
<td>11.8%</td>
</tr>
<tr>
<td>1999</td>
<td>457</td>
<td>1,394,336</td>
<td>$14.00</td>
<td>$19.52 m</td>
<td>8.0%</td>
</tr>
<tr>
<td>2000</td>
<td>346</td>
<td>1,554,172</td>
<td>$14.00</td>
<td>$21.76 m</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

Tab. 16. Mean and median first-day returns, median age, sales, EPS, and share overhang, and industry representation categorized by underwriter prestige (after Loughran, Ritter (2004)).

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>N</td>
<td>Return</td>
<td>N</td>
<td>Return</td>
</tr>
<tr>
<td>Low</td>
<td>9.1%</td>
<td>1.119</td>
<td>12.9%</td>
<td>1.302</td>
</tr>
<tr>
<td>High</td>
<td>5.1%</td>
<td>863</td>
<td>15.9%</td>
<td>2.094</td>
</tr>
<tr>
<td>Median</td>
<td>2.5%</td>
<td>1.119</td>
<td>7.1%</td>
<td>1.302</td>
</tr>
<tr>
<td>Age</td>
<td>9 years</td>
<td>1,115</td>
<td>7 years</td>
<td>1,298</td>
</tr>
<tr>
<td>Low</td>
<td>2.1%</td>
<td>849</td>
<td>8 years</td>
<td>2,050</td>
</tr>
<tr>
<td>High</td>
<td>1.2%</td>
<td>863</td>
<td>8.7%</td>
<td>2,094</td>
</tr>
<tr>
<td>Median</td>
<td>$21.5</td>
<td>1,086</td>
<td>$25.8</td>
<td>1,268</td>
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<td>Sales</td>
<td>$80.2</td>
<td>861</td>
<td>$71.7</td>
<td>2,082</td>
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<tr>
<td>EPS</td>
<td>$0.38</td>
<td>1,099</td>
<td>$0.25</td>
<td>1,302</td>
</tr>
<tr>
<td>Low</td>
<td>$0.59</td>
<td>855</td>
<td>$0.27</td>
<td>2,094</td>
</tr>
<tr>
<td>High</td>
<td>2.8%</td>
<td>1,119</td>
<td>1.9%</td>
<td>1,302</td>
</tr>
<tr>
<td>Median</td>
<td>$2.8%</td>
<td>863</td>
<td>2.4%</td>
<td>2,094</td>
</tr>
<tr>
<td>Share</td>
<td>7.3%</td>
<td>1,982</td>
<td>14.8%</td>
<td>3,396</td>
</tr>
<tr>
<td>Industry</td>
<td>50.6%</td>
<td>1,119</td>
<td>28.3%</td>
<td>1,302</td>
</tr>
<tr>
<td>Technology</td>
<td>27.1%</td>
<td>863</td>
<td>34.0%</td>
<td>2,094</td>
</tr>
</tbody>
</table>

Toniato (2007) stated that the IPO underpricing was documented in Stoll, Curley (1970) for the first time: “Stoll and Curley (1970) were the pioneers in documenting the systematically abnormal first-day returns of IPOs. In the following years the same phenomenon was observed in the UK Buckland, Herbert and Yeomans (1981) and later in virtually every capital market in world. Furthermore, contrary to the idea that the market would learn and rectify this anomaly with time, Ritter and Welch (2002) document a significant trend of increase in this pattern of underpricing over time.”
The existing underpricing theories are discussed below in details in Toniato (2007):

“1) Some researchers explain IPO underpricing by proposing it is a signalling mechanism. This theory is based on an asymmetry of information between issuers and investors; which generates a lemons problem since only low quality issuers will be willing to sell their shares at the average price. The model, therefore, predicts that high quality issuers will signal their superiority by selling shares at a price lower than the market believes they are worth. These high quality issuers are believed to be compensated for their sacrifice in the future when “a higher price at the seasoned offering eventually compensates firms for the intentionally low IPO price” Welch (1989). However, further research contested this theory and found no evidence of under priced IPOs consistently returning to the market for seasoned offerings Michaely, Shaw (1994).

2) Another theory based on asymmetry of information and one of the most compelling models in explaining IPO performance is the one created by Rock (1986). The model applies the concept of a winner’s curse to the IPO market. According to this theory, investors can be classified as ‘informed’ or ‘uniformed’. The former are investors who are willing to incur the costs to assess the future performance of new issues and the latter are investors who do not spend resources on the analysis of IPOs and indiscriminately invest in all new issues. Since informed investors will only apply for under priced IPOs and uninformed investors apply to all; under priced issues will be oversubscribed while the over priced issues will be relatively undersubscribed. Consequently, the investor who applies for all new issues finds himself in the long run holding a much larger amount of over priced IPOs. Hence, if all IPOs are priced at the underlying value, uninformed investors make systematic losses and leave the market. Rock’s model, therefore, anticipates that underwriters will systematically underprice all issues fearing that otherwise the uninformed investor might leave the IPO market ensuing shorter liquidity and a decrease in profitability for investment banks. The model found support in empirical studies including Keloharju (1993), Koh and Walter (1989) and recently in the UK Khursheed and Mudambi (2002) who find no significant underpricing in investment trusts IPOs and conclude that this partially due to the smaller differential of information between uninformed and informed investors about this type of firm.

3) Baron (1982) offers an explanation which focuses on the asymmetry of information not between investors and underwriters but between issuing firms and underwriters. The model assumes that investment bankers have more information about the demand for IPO shares in the market and therefore the issuer could only monitor the work of the underwriter for a cost. This makes it optimal for the issuer to allow a certain degree of underpricing. This model found some
empirical support in the work of Khurshed and Mudambi (2002). However, Muscarella and Vetsuypens (1989) found that when investment banks themselves go public the underpricing is as large as on other types of firms, casting doubt on the validity of the theory.

4) Models which do not rely on the asymmetry of information include the theory that investment bankers possess a monopsony power over small issuing firms, which can be used to lower the risk of losses for investment banks. This model also infers that underwriters can use this power to distribute underpriced IPOs to favoured clients. In tune with this prediction Cornelli and Goldreich (2001) in the UK and Aggarwal, Prabhala and Puri (2002) in the US conclude that underwriters favor institutional investors on the allocation of shares. However, other recent research contested this idea and found that “underpricing has little or no effect on outside block ownership” Field and Sheehan (2002).

5) Finally, Tinic (1988) provides a further model not dependent on the asymmetry of information. The author develops a litigation theory which predicts that issuers and underwriters use underpricing as form of insurance against legal action. The model assumes an implied agreement between all parts involved in an IPO, where investors are rewarded with excess returns in the short run in exchange for neglecting small errors related to disclosure requirement for issuing firms. Drake and Vetsuypens (1993) challenged the model finding that on average sued IPOs actually had higher underpricing than those not sued.

Tab. 17 presents an international evidence of short-run underpricing in Toniato (2007).

<table>
<thead>
<tr>
<th>Country</th>
<th>Reference(s)</th>
<th>Sample size</th>
<th>Time period</th>
<th>Average initial return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Lee, Taylor and Walter (1996)</td>
<td>266</td>
<td>1976-89</td>
<td>11.90%</td>
</tr>
<tr>
<td>Austria</td>
<td>Aussenegg (1997)</td>
<td>67</td>
<td>1964-96</td>
<td>6.50%</td>
</tr>
<tr>
<td>Brazil</td>
<td>Aggarwal, Leal and Hernandez (1993)</td>
<td>62</td>
<td>1979-90</td>
<td>78.50%</td>
</tr>
<tr>
<td>Canada</td>
<td>Jog and Srivastava (1994)</td>
<td>258</td>
<td>1971-92</td>
<td>5.40%</td>
</tr>
<tr>
<td>Chile</td>
<td>Aggarwal, Leal and Hernandez (1993)</td>
<td>19</td>
<td>1982-90</td>
<td>16.30%</td>
</tr>
<tr>
<td>Finland</td>
<td>Kelolharju (1993)</td>
<td>85</td>
<td>1984-92</td>
<td>9.60%</td>
</tr>
<tr>
<td>Germany</td>
<td>Ljungqvist (1997)</td>
<td>170</td>
<td>1978-92</td>
<td>10.90%</td>
</tr>
<tr>
<td>Japan</td>
<td>Hebner and Hiraki (1993); Hamao, Packer and Ritter (1998)</td>
<td>975</td>
<td>1970-96</td>
<td>24.00%</td>
</tr>
<tr>
<td>Korea</td>
<td>Dhatt, Kim and Lim (1993)</td>
<td>347</td>
<td>1980-90</td>
<td>78.10%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Vos and Cheung (1993)</td>
<td>149</td>
<td>1979-91</td>
<td>28.80%</td>
</tr>
<tr>
<td>Sweden</td>
<td>Ridder (1986); Rydqvist (1993)</td>
<td>213</td>
<td>1970-91</td>
<td>39.00%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Levis (1993)</td>
<td>2,133</td>
<td>1959-90</td>
<td>12.00%</td>
</tr>
<tr>
<td>United States</td>
<td>Fbotson, Sindelar and Ritter (1994)</td>
<td>13,308</td>
<td>1960-96</td>
<td>15.80%</td>
</tr>
</tbody>
</table>

Sources: Loughran, Ritter, Rydqvist (1994), Ritter (1998) as well as the listed authors for each study.

Tab. 17. International evidence of short-run underpricing (after Toniato (2007)).
**Toniato (2007)** “Theoretical models explaining the long run behaviour of IPOs are less plentiful than the ones relating to the short run behaviour. **Khurshed, Mudambi and Goergen (1999)** separates these theories in three groups:

1) one which provides behaviour and expectations-based explanations for the phenomenon,

2) one which bases its explanations in the agency theory, and

3) a final group which deem the observed underperformance a result of mis-measurement.”

Tab. 18 presents an international evidence of the long-run performance of IPOs in **Toniato (2007)**.

<table>
<thead>
<tr>
<th>Country</th>
<th>Reference</th>
<th>Sample size</th>
<th>Time period</th>
<th>Average initial return</th>
</tr>
</thead>
<tbody>
<tr>
<td>Australia</td>
<td>Lee, Taylor and Walter (1996)</td>
<td>266</td>
<td>1976-89</td>
<td>-46.50%</td>
</tr>
<tr>
<td>Austria</td>
<td>Aussengr (1997)</td>
<td>67</td>
<td>1964-96</td>
<td>-27.30%</td>
</tr>
<tr>
<td>Brazil</td>
<td>Aggarwal et al. (1993)</td>
<td>62</td>
<td>1979-90</td>
<td>-47.00%</td>
</tr>
<tr>
<td>Chile</td>
<td>Aggarwal et al. (1993)</td>
<td>19</td>
<td>1982-90</td>
<td>-23.70%</td>
</tr>
<tr>
<td>Finland</td>
<td>Keloharju (1993)</td>
<td>85</td>
<td>1984-92</td>
<td>-21.10%</td>
</tr>
<tr>
<td>Germany</td>
<td>Ljungqvist (1997)</td>
<td>170</td>
<td>1978-92</td>
<td>-12.10%</td>
</tr>
<tr>
<td>Japan</td>
<td>Cai and Wei (1997)</td>
<td>975</td>
<td>1970-96</td>
<td>-27.00%</td>
</tr>
<tr>
<td>Korea</td>
<td>Dhatt, Kim and Lim (1993)</td>
<td>347</td>
<td>1980-90</td>
<td>2.00%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>Firth (1997)</td>
<td>143</td>
<td>1979-87</td>
<td>-10.00%</td>
</tr>
<tr>
<td>Sweden</td>
<td>Loughran, Ritter and Rydqvist (1994)</td>
<td>162</td>
<td>1980-90</td>
<td>1.20%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>Levis (1993)</td>
<td>712</td>
<td>1980-88</td>
<td>-8.10%</td>
</tr>
<tr>
<td>United States</td>
<td>Loughran and Ritter (1995)</td>
<td>4,753</td>
<td>1970-90</td>
<td>-20.00%</td>
</tr>
</tbody>
</table>

Sources: Kooli and Suret (2004), Loughran, Ritter and Rydqvist (1994), Ritter (1998) as well as the listed authors of each study.

**Tab. 18. International evidence of long-run performance of IPOs (after Toniato (2007)).**

**Yongyuan Qiao (2008)** researched both the time series properties of the level of IPO shares underpricing and the volume of IPO shares selling in Hong Kong equity market from **November, 1999** to the end of **2005**.

Fig. 6 shows a total number of IPOs at **Hong Kong Stock Exchange**; Fig. 7 demonstrates an average IPO capitalization at **Hong Kong Stock Exchange**; Fig. 8 provides some information on an average IPO underpricing levels across the countries in **Yongyuan Qiao (2008)**.
Fig. 6. Number of IPOs at Hong Kong Stock Exchange (after Yongyuan Qiao (2008)).

Fig. 7. Average IPO capitalization at Hong Kong Stock Exchange (after Yongyuan Qiao (2008)).

Fig. 8. Average IPO underpricing levels across countries (after Yongyuan Qiao (2008)).
Pennacchio, Del Monte, Acconcia (2010) suggested that the original hypothesis that the distance of a firm from the main financial centre affects underpricing positively: The higher is the distance; the higher are the information imperfections among players involved in the Initial Public Offering and the higher is the uncertainty about the true value of the listing firm. This research proposal is in an agreement with the theoretical approach that explains the underpricing in the context of the asymmetric information flows theory.

Tab. 19 shows the determinants of underpricing in Italy, France and Germany (1999 - 2009) in Pennacchio, Del Monte, Acconcia (2010).

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Distance</strong></td>
<td>0.019***</td>
<td>0.021***</td>
<td>0.021***</td>
<td>0.003***</td>
<td>0.013</td>
</tr>
<tr>
<td></td>
<td>(0.006)</td>
<td>(0.006)</td>
<td>(0.008)</td>
<td>(0.001)</td>
<td>(0.012)</td>
</tr>
<tr>
<td><strong>Revision</strong></td>
<td>6.75***</td>
<td>6.93***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.42)</td>
<td>(2.54)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Size</strong></td>
<td>-0.83**</td>
<td>-0.52</td>
<td>-1.01***</td>
<td>0.36</td>
<td>-2.05**</td>
</tr>
<tr>
<td></td>
<td>(0.34)</td>
<td>(0.37)</td>
<td>(0.33)</td>
<td>(0.23)</td>
<td>(0.91)</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td>-3.52**</td>
<td>-2.44*</td>
<td>-2.69*</td>
<td>-0.22</td>
<td>-3.91**</td>
</tr>
<tr>
<td></td>
<td>(1.47)</td>
<td>(1.39)</td>
<td>(1.45)</td>
<td>(0.45)</td>
<td>(1.79)</td>
</tr>
<tr>
<td><strong>Index Return</strong></td>
<td>0.92**</td>
<td>1.04**</td>
<td>1.15**</td>
<td>0.19***</td>
<td>0.34</td>
</tr>
<tr>
<td></td>
<td>(0.40)</td>
<td>(0.45)</td>
<td>(0.57)</td>
<td>(0.08)</td>
<td>(0.46)</td>
</tr>
<tr>
<td><strong>Index Volatility</strong></td>
<td>0.016*</td>
<td>0.016*</td>
<td>0.015*</td>
<td>0.02***</td>
<td>0.11***</td>
</tr>
<tr>
<td></td>
<td>(0.009)</td>
<td>(0.01)</td>
<td>(0.008)</td>
<td>(0.006)</td>
<td>(0.021)</td>
</tr>
<tr>
<td><strong>Reputation</strong></td>
<td>-6.63**</td>
<td>-6.11**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.59)</td>
<td>(2.67)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Greenshoe</strong></td>
<td>-0.72**</td>
<td>-0.65**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.33)</td>
<td>(0.31)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Oversubscription</strong></td>
<td>9.95*</td>
<td>10.85*</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(5.99)</td>
<td>(5.85)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>-0.34</td>
<td>-0.038</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.045)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Service Sector</strong></td>
<td>5.07*</td>
<td>3.79</td>
<td>-2.82***</td>
<td>7.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.90)</td>
<td>(3.05)</td>
<td>(0.96)</td>
<td>(5.61)</td>
<td></td>
</tr>
<tr>
<td><strong>Financial Sector</strong></td>
<td>6.89**</td>
<td>7.5**</td>
<td>1.04</td>
<td>-9.75***</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.80)</td>
<td>(3.38)</td>
<td>(1.55)</td>
<td>(4.05)</td>
<td></td>
</tr>
<tr>
<td><strong>Fees</strong></td>
<td>2.32*</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.31)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Constant</strong></td>
<td>14.11</td>
<td>1.62</td>
<td>11.73**</td>
<td>-5.20</td>
<td>34.39**</td>
</tr>
<tr>
<td></td>
<td>(9.78)</td>
<td>(9.56)</td>
<td>(5.69)</td>
<td>(4.01)</td>
<td>(16.49)</td>
</tr>
<tr>
<td><strong>R²</strong></td>
<td>0.4656</td>
<td>0.5014</td>
<td>0.2755</td>
<td>0.0786</td>
<td>0.1606</td>
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<tr>
<td><strong>F-statistic</strong></td>
<td>12.36</td>
<td>12.56</td>
<td>2.8</td>
<td>3.78</td>
<td>7.03</td>
</tr>
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<td><strong>Observations</strong></td>
<td>134</td>
<td>124</td>
<td>134</td>
<td>332</td>
<td>308</td>
</tr>
</tbody>
</table>

*Notes: Figures in parentheses are standard errors.***, **, * Significant at 1%, 5% and 10%.*

Tab. 19. Determinants of underpricing in Italy, France and Germany (1999-2009) (after Pennacchio, Del Monte, Acconcia (2010)).
Pennacchio (2013) proposes that: “The underpricing difference is actually due to the causal effect of venture capital backing and that the raw comparison of the sample means underestimates such an effect. The result is consistent with the certification hypothesis, that is, certifying that the value of issuing firms reflects all relevant inside information, venture capital backing reduces the asymmetric information problem that arises in the IPO process.”

Tab. 20 shows the Italian IPOs by year of listing, and Tab. 21 demonstrates the characteristics of the VC backed and non-VC backed IPOs in Pennacchio (2013).

<table>
<thead>
<tr>
<th>Year</th>
<th>Total Number of IPOs</th>
<th>Venture capital backed IPOs</th>
<th>Market Return</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Number</td>
<td>% of total IPOs</td>
</tr>
<tr>
<td>1999</td>
<td>27</td>
<td>9</td>
<td>33.3</td>
</tr>
<tr>
<td>2000</td>
<td>42</td>
<td>12</td>
<td>28.6</td>
</tr>
<tr>
<td>2001</td>
<td>17</td>
<td>4</td>
<td>23.5</td>
</tr>
<tr>
<td>2002</td>
<td>5</td>
<td>1</td>
<td>20.0</td>
</tr>
<tr>
<td>2003</td>
<td>4</td>
<td>2</td>
<td>50.0</td>
</tr>
<tr>
<td>2004</td>
<td>8</td>
<td>4</td>
<td>50.0</td>
</tr>
<tr>
<td>2005</td>
<td>15</td>
<td>6</td>
<td>40.0</td>
</tr>
<tr>
<td>2006</td>
<td>21</td>
<td>8</td>
<td>38.1</td>
</tr>
<tr>
<td>2007</td>
<td>28</td>
<td>12</td>
<td>42.9</td>
</tr>
<tr>
<td>2008</td>
<td>6</td>
<td>3</td>
<td>60.0</td>
</tr>
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<td>2009</td>
<td>4</td>
<td>2</td>
<td>50.0</td>
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<td>2010</td>
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<td>25.0</td>
</tr>
<tr>
<td>2011</td>
<td>2</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>2012</td>
<td>1</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td></td>
<td>188</td>
<td>65</td>
<td>34.6</td>
</tr>
</tbody>
</table>

*Tab. 20. Italian IPOs by year of listing after Pennacchio (2013).*

<table>
<thead>
<tr>
<th>VC backed IPOs</th>
<th>non-VC backed IPOs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>Median</td>
</tr>
<tr>
<td>-------</td>
<td>--------</td>
</tr>
<tr>
<td>Panel A. Firm characteristics</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>20.9</td>
</tr>
<tr>
<td>Capitalization (Market value)</td>
<td>326</td>
</tr>
<tr>
<td>Total asset</td>
<td>235</td>
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<tr>
<td>Net asset (Patrimonio Netto)</td>
<td>73</td>
</tr>
<tr>
<td>Revenue</td>
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<tr>
<td>Offer proceeds</td>
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<tr>
<td>Debt Equity</td>
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<tr>
<td>Roe (%)</td>
<td>38</td>
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<tr>
<td>Ros (%)</td>
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<td>Panel B. Offering characteristics</td>
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<tr>
<td>Oversubscription</td>
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<td>Greenshoe (%)</td>
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<td>Range</td>
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<tr>
<td>Share offered</td>
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<tr>
<td>Underwriter reputation</td>
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<tr>
<td>Gross spread</td>
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</tbody>
</table>

*Tab. 21. Characteristics of VC backed and non-VC backed IPOs (after Pennacchio (2013)).*
Pennacchio (2013) writes: “The provided empirical evidence indicates that venture capital backing play an important role in the reduction of information asymmetries between issuing firms and outside investors, and consequently of the IPO underpricing. Given that the underpricing is considered as the main indirect cost of floatation, the result suggests that an efficient venture capital industry may help to overcome the so called “funding gap” – the financing problems faced by new and small firms – with wide advantages for the overall economy.”

Tab. 22 presents the regression analysis: The effect of venture capital backing on the IPO underpricing in Pennacchio (2013).

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
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<td>$Y = \text{underpricing}$</td>
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<tr>
<td>Venture Backing</td>
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<td>-4.63*</td>
<td>-6.02**</td>
<td>-7.13**</td>
</tr>
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<td></td>
<td>(-2.59)</td>
<td>(-3.19)</td>
<td>(-1.89)</td>
<td>(-2.19)</td>
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<td>Bank Uw</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>-4.51*</td>
<td>-4.52**</td>
<td>-4.23*</td>
</tr>
<tr>
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<td></td>
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<td>(-1.84)</td>
<td>(-1.96)</td>
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<tr>
<td>Venture Backing – Underwriter reputation</td>
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<td>0.22</td>
<td>0.21</td>
<td></td>
<td></td>
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<tr>
<td></td>
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<tr>
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<td>-1.54**</td>
<td>-1.51**</td>
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<tr>
<td>Underwriter Reputation</td>
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<td>-0.15*</td>
<td>-0.16***</td>
</tr>
<tr>
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<td>(-1.81)</td>
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<td>Distance</td>
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<td>Range</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>0.06***</td>
<td>0.06***</td>
<td>0.06***</td>
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<td></td>
<td>(3.22)</td>
<td>(3.55)</td>
<td>(3.37)</td>
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<td>Fees</td>
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<td>1.57*</td>
<td>1.65**</td>
</tr>
<tr>
<td></td>
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<td>(1.61)</td>
<td>(1.75)</td>
<td>(2.04)</td>
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<tr>
<td>Greenshoe</td>
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<td>-0.34**</td>
<td>-0.33**</td>
</tr>
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<td>Revision</td>
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<td>Constant</td>
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<td>61.06***</td>
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<td>4.98</td>
<td>4.69</td>
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<td>168</td>
<td>163</td>
<td>148</td>
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<td>Pseudo $R^2$</td>
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<td>0.20</td>
<td>0.42</td>
<td>-</td>
<td>-</td>
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<td>Wald Test ($p$-value)</td>
<td>-</td>
<td>-</td>
<td>0.05</td>
<td>0.06</td>
<td></td>
</tr>
</tbody>
</table>

* *** , ** , * statistically significant at 1, 5 and 10% level.

**Tab. 22. Regression analysis: the effect of venture capital backing on the IPO underpricing (after Pennacchio (2013)).**
Pennacchio, Del Monte, Acconcia (2010) note: “IPO process involves both direct costs (underwriting and audit fees, selling commission, legal expenses, etc.) and indirect costs. Underpricing is considered the larger indirect cost.”

Pritsker (2004, 2006) proposed a fully-rational liquidity-based theory of IPO underpricing and underperformance: “In the model, underwriters need to sell a fixed number of shares at the IPO or in the aftermarket. To maximize revenue and avoid selling into the aftermarket where they can be exploited by large investors, underwriters distort share allocations towards investors with market power, and set the IPO offer price below the aftermarket trading price. Large investors who receive IPO share allocations sell them slowly afterwards to reduce their trade’s price-impact. This curtails the shares that are available to small price-taking investors, causing them to bid up prices and bid down returns. In some simulations, the distorted share allocations and slow unwinding behavior generate post-IPO return underperformance that persists for several years.”

Zhang J X (2009) makes an interesting remark that the level of underpricing reduces in the case of the decrease of the degree of information asymmetry about the firm at the time of the IPO: “The information about the firm is disclosed so as to inform investors about the firm's value at the time of the IPO. Correct information about the quality of innovation of a firm at the time of the IPO can exhibit important information about its attainment in the IPO market. Therefore, if credible information on the value of a firm is provided at the time of the IPO, information asymmetry and the underpricing of the firms will be reduced Rock (1986). At the time of the IPO, information asymmetry as to the firm's value will decrease with the disclosure of accurate information about the value of the firm's innovation stock. This decrease in information asymmetry will be associated with an identical decrease in the underpricing of market valuations.”


Long term performance of initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

Von Eije, de Witte, van der Zwaan (2000) study the long term-performance of IPOs in the Netherlands: “The shareholders that stay with the company after the IPO and the new shareholders, however, do not necessarily profit from the listing. Much empirical literature on initial public offerings (IPOs) that addresses the long-term performance of IPOs suggests that these stockholders may not profit from the IPO because the IPO companies show underperformance.” Von Eije, de Witte, van der Zwaan (2000) present a short review on the origins of IPO underperformance: “Several explanations arise for this anomalous phenomenon.
Ritter [1991, 1997] suggests various reasons for underperformance. Issuer's timing, risk mismeasurement, fads as well as the fact that mainly optimistic investors will be prepared to buy overpriced new IPO stock may all contribute to long term underperformance. Welch [1989, 1996] proposes that low quality (underperforming) companies cannot mimic the signals of high quality companies of which the owners issue IPO-shares at a discount and then wait patiently before selling the remainder of the firm in a seasoned equity offering. Hughes and Thakor [1992] suggest that long-term underperformance originates from potential legal liabilities of misrepresenting the quality of the IPO-shares. Carter, Dark and Singh [1998] attribute lower performance to lower underwriter's quality. Teoh, Welch and Wong [1998], finally, explain underperformance from window dressing before the company goes public. Von Eije, de Witte, van der Zwaan (2000) highlight the idea that IPO can induce the certain changes within the company: "In this article we present the results of a survey on IPO-related organizational change amongst 27 corporate officers of companies that received a listing at the Amsterdam Stock Exchange during 1987-1997... Long-term performance is not only based on company products, markets and financing, but originates also from within the company. This research finds that an IPO (or the preparation for an IPO) can cause changes within a company. These IPO-related changes are not necessarily financial but they can contribute positively to long-term performance."

Cogliati, Paleari, Vismara (2010) write: “The aftermarket performance is measured using Buy-and-Hold Abnormal Returns (BHAR), see Loughran and Ritter (1995), which are calculated for stock $i$ over a time period $T$ as follows

$$BHR_{i,T} = \prod_{t=1}^{T} (1 + R_{i,t}) - 1,$$

$$BHAR = \frac{1}{N} \sum_{i=1}^{N} \left[ \left( \prod_{t=1}^{T} (1 + R_{i,t}) \right) - \prod_{t=1}^{T} (1 + R_{M,t}) \right],$$

where $R_{i,t}$ is the return of stock $i$ at the time $t$, and $N$ is the number of stocks in the portfolio.

Trauten, Schulz (2006) researched the IPOs long time performances in Germany: “We study the performance of an investment in each IPO by comparing the buy-and-hold return of each IPO to the buy-and-hold benchmark return irrespective of the IPO point in calendar time. As we ignore calendar time, this analysis resembles an event study methodology. Several different approaches to measuring long-term performance of stocks in event time are discussed in the literature. Among the most established methodologies are the Buy-and-Hold Abnormal Return approach (BHAR) firstly mentioned by Cusatis, Miles and Woolridge (1993), the
Cumulative Abnormal Return approach (CARs) by Fama et al. (1969) and the Wealth Relative method by Ritter (1991).

In the case of each IPO investments strategies, Trauten, Schulz (2006) use the following formulas to calculate the buy-and-hold abnormal return and the mean of the buy-and-hold abnormal returns:

\[
BHAR_{H,i} = \left[ \prod_{h=1}^{H} (R_{i,t} + 1) \right] - \left[ \prod_{h=1}^{T} (R_{B,i,t} + 1) \right],
\]

\[
\overline{BHAR}_H^S = \frac{1}{N} \sum_{i=1}^{N} w_i \left[ \left( \prod_{h=1}^{H} (R_{i,t} + 1) \right) - \left( \prod_{h=1}^{T} (R_{B,i,t} + 1) \right) \right],
\]

where \( R_{i,t} \) is the total return of firm \( i \) in the calendar month \( t \), following the IPO,

\( R_{B,i,t} \) is the total return of a benchmark portfolio for firm \( i \) in calendar month \( t \) for a maximum holding period \( H \),

\( w_i = 1/N \) in case of investment strategy 1,

\( w_i = \) market value of firm \( i \) at the end of the IPO month \( / \) sum of market values of all firms at the end of the respective IPO months in case of investment strategy 2.

In the case of IPO-portfolio investment strategies, Trauten, Schulz (2006) calculate the excess buy-and-hold abnormal return of investment strategies \( S=\{3,4\} \) for a formation period of \( F \) months and a sample period of \( \tau = T \) calendar months

\[
BHAR^S_{F,T} = \prod_{\tau=1}^{T} \left[ \sum_{i=1}^{N_{F,\tau}} w_{i,\tau} \cdot R_{i,\tau} \right] + 1 \right] - \prod_{\tau=1}^{T} \left[ \sum_{i=1}^{N_{F,\tau}} w_{i,\tau} \cdot R_{b,i,\tau} \right] + 1 \right],
\]

where \( R_{i,\tau} \) = return of firm \( i \) in calendar month \( \tau \),

\( R_{b,i,\tau} \) = return of the benchmark portfolio \( b \) for firm \( i \) in calendar month \( \tau \),

\( N_{F,\tau} \) = number of firms that went public in the \( F \) months prior to calendar month \( \tau \),

\( w_{i,\tau} = 1 \) in case of each IPO is weighted equally (equally weighted strategy 3),

\( w_{i,\tau} = \) market value of firm \( i \) in calendar month \( \tau \) divided by the sum of the market values of all firms \( N_{F,\tau} \) in calendar month \( \tau \) (value weighted strategy 4).

Tab. 23 provides some information on the research works to study the long-run performance of IPOs in Trauten, Schulz (2006).
Among a big number of interesting researches on the long term performance of IPOs, it is necessary to highlight the research in Serve (2004), who investigated a change in the operating performance of 115 firms that go public on the French New Market over the period 1996-2000: “A significant decline in operating performance subsequent to the Initial Public Offering (IPO) is found. Companies appears to sustain sales growth but not capital expenditure after the IPO. Additionally, there is a significant negative relation between post-IPO change in operating performance and equity retention by the original ownership.”}


\[
\text{Tab. 23. Long-run performance of IPOs in Germany (after Trauten, Schulz (2006)).}
\]

<table>
<thead>
<tr>
<th>Author(s) (year)</th>
<th>Sample period</th>
<th>Number of IPOs</th>
<th>Benchmark</th>
<th>Holding period (months)</th>
<th>Excess return (%)</th>
<th>Calculation method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ehrhardt (1997)</td>
<td>1960-1990</td>
<td>159</td>
<td>Size-portfolio (ew)</td>
<td>36</td>
<td>-0.6</td>
<td>BHAR</td>
</tr>
<tr>
<td>Sapusek (2000)</td>
<td>1983-1993</td>
<td>142</td>
<td>Benchmark firms (by size)</td>
<td>60</td>
<td>-34.7</td>
<td>CAR</td>
</tr>
<tr>
<td>Gerke/Fleischer (2001)</td>
<td>1997-2000</td>
<td>263 (NM)</td>
<td>Nemax All-Share</td>
<td>12</td>
<td>96.6 ***</td>
<td>BHAR</td>
</tr>
</tbody>
</table>

Information absorption by investors on company equity value in time of initial public offering of company equity at stock exchanges in imperfect highly volatile global capital markets with induced nonlinearities

Let us explain that the absorption theory has been created to understand the nature of absorption processes of different chemical compounds in the various physical – chemical systems, which have been observed in the well known experiments in the physics and chemistry. This theory has been further developed by the prominent researchers at the world class research institutions and top league universities in a number of countries over the centuries. Let us emphasis some of the completed theoretical and experimental research projects to study the absorption phenomena in the material sciences:


2. The absorption of the electromagnetic signals in the condensed matter (the metals and superconductors) at the ultrasonic frequencies in the solid state physics has been investigated in Ledenyov O P (2012a, b, c), Ledenyov V O, Ledenyov D O, Ledenyov O P, Tikhonovsky (2012), Ledenyov O P, Fursa V P (2012), Shepelev, Ledenyov O P, Filimonov (2012a, b, c, d, e).

In the econophysics, the absorption phenomena can frequently be observed in the frames of the evolving learning process at the various practical settings and applications in the economics and finances. A new perspective on the learning and innovation with the particular research focus on the absorptive capacity has been presented in Cohen, Levinthal (1990), Farina (2008), Hussinger (2010, 2012). There are a few innovative studies, which have been focused on the knowledge and information absorptive capacity by the firm in Farina (2008): “According to Cohen and Levinthal’s (1990) “absorptive capacity” concept, firms’ ability to get knowledge and information from their external environment is a function of the firms’ specialization choices and experiences. In particular, firms operating in many market segments are likely to possess more internal capabilities than firms operating in few market segments since, as the volume and complexity of information in the environment increase, the organization needs to have correspondingly high levels of information processing capacity (Miller and Chen (1994); Hambrick, (1982); Khandwalla (1973)).” Farina (2008) continues to explain: “In fact firms’ ability to use network ties for accessing information about opportunities and choices otherwise not available is depending on internal resource endowments and in particular on “absorptive capacity”. In our case, the absorption effect has place during the information absorption process by the investors on the company equity value at the IPO. Therefore, the influence by the absorption process on the investors decisions, regarding the IPOs is in the scope of our present research interest. In our opinion, every company creates the barriers to entry; defines the strategic boundaries; and encounters the limits to growth, using the accumulated knowledge base (the firm-level technology absorption capacity), in the specific industry in Chandler (1962, 1998; 1977, 1993; 1980; 2001; 2005). In an analogy with the above described research results, we would like to highlight the fact that the investors learn about the listed company by absorbing the information on the company, aiming to get the deep and broad knowledge on the company’s barriers to entry; strategic boundaries; and limits to growth in the process of investment decision making. The learning processes by the individual and institutional investors have been
discussed in *Yao-Min Chiang, Hirshleifer, Yiming Qian, Sherman (2010)*: “This evidence indicates that *individual investors* are subject to *naïve reinforcement learning*. When individual investors receive high returns from previous auctions, they become more optimistic about receiving high returns from future auctions, making them more likely to participate in future auctions and to bid more aggressively. In sharp contrast, there is little sign that *institutional bidders* are subject to this bias. Their decisions to participate in an *IPO* auction are unrelated to their past returns. Furthermore, their returns do not decline with experience as they bid in more auctions, and their auction selection and bid shaving abilities do not deteriorate with experience.”

Here, let us consider the meanings of the *deep knowledge* and the *broad knowledge* as described in *Moldoveanu, Martin (2001)*: “The *general knowledge* – knowledge that can be easily taught and transferred by means of formalized dialects – and *specific knowledge* – knowledge that cannot be easily encoded and transferred. However, within each different kind of knowledge we can talk of a distinction between the depth of the knowledge and the breadth of the knowledge. *Knowledge is deep when it is of the sort that can answer many concatenated ‘why?’ questions.* The physicist’s and the mathematician’s knowledge are examples of deep knowledge. It has a hierarchical structure, with a few basic propositions at the top of the hierarchy, from which all other propositions follow by self-evident steps. *Knowledge is broad when it can be used to answer many questions of the type: ‘what?’, ‘where?’, ‘who?’ and ‘how?’.* The economist’s and the biologist’s knowledge are examples of broad knowledge. There are few key fundamental; assumptions that can compress all of this knowledge, which consists of a large set of empirical findings and basic causal mechanisms which only work when certain conditions come about.”

We would like to make the following research proposals:

1. We propose that the *information absorption* by the investors occurs in the *evolving learning process* about the company’s equity value, taking to the consideration the *fundamental purpose of investing* and the *responsibilities of investors*. The *fundamental purpose of investing* is explained in *Porter (2013)*: “The *fundamental purpose of investing* is to deploy capital to productive uses in the real economy.” The *responsibilities of investor* are discussed in *Porter (2013)*: “Beyond allocating capital, investors also play a vital role in monitoring what companies are doing, pushing for transparency, and intervening to catalyze change if the capital employed isn’t generating the economic value it should.” We would like to add that the investors have to invest the capital into the companies, which create the “*shared value,*” generating the economic value in a way that also produces the value for the society by addressing its challenges.

2. We think that the *information absorption* capacity by the investors on the company equity value at the *IPO* impacts the investor’s *investment decisions* and serves as a pre-
determinant of the successful IPO deal completion. We propose the *Ledenyov theory on the origins of the underpricing and long term underperformance effects*, which states that the underpricing and long term underperformance can be explained by the changing information absorption capacity by the investors on the company equity value, depending on both:

1) The **internal factors**:

   a) The investor’s ability to conduct the *creative imperative integrative intelligent conceptual co-lateral adaptive logarithmic thinking* with the application of the *inductive, deductive and abductive logics analysis* as far as the fundamental value of company equity is concerned;

   b) The *ultra fast decoding of acquired information on the fundamental value of company equity*;

   c) The *ultra fast processing of acquired information on the fundamental value of company equity*.

2) The **external factors**:

   a) The presence of the *asymmetric information on the fundamental value of company equity* between the investors and the underwriters (issuers);

   b) The *agency problems* in relation to the fundamental value of company equity;

4. We advocate for the responsible investing as in Porter (2013): “Directing capital to companies that can use it productively is ultimately the most profound benefit investors can have on society.” We have the strategic vision that the best time moment for the Initial Public Offering of the company’s equity at the selected stock exchange in the global capital markets with the nonlinearities can only be selected, using the Vacheron Constantin Patrimony Traditionnelle Caliber 2755 high precision timepiece.

Conclusion

This innovative research considers the complicated problem of the initial public offering of the company equity at the stock exchanges in the global capital markets with the nonlinearities. We compare the initial listing requirements on the main, parallel, new, and unregulated growth markets. We analyze the IPO techniques: the fixed-price offerings, auctions, and book-building issues. We focus on the IPO initial underpricing, long-run performance and after market liquidity problems. We made the following original research propositions:

1. We propose that the information absorption by the investors occurs in the evolving learning process about the company’s value, taking to the consideration the fundamental purpose of investing and the responsibilities of investors. The fundamental purpose of investing is explained in Porter (2013): “The fundamental purpose of investing is to deploy capital to productive uses in the real economy.” The responsibilities of investor are discussed in Porter (2013): “Beyond allocating capital, investors also play a vital role in monitoring what companies are doing, pushing for transparency, and intervening to catalyze change if the capital employed isn’t generating the economic value it should.” We would like to add that the investors have to invest the capital into the companies, which create the “shared value,” generating the economic value in a way that also produces the value for the society by addressing its challenges.

2. We think that the information absorption capacity by the investors on the IPOs impacts the investor’s investment decisions and serves as a pre-determinant of the successful IPO deals completion. We propose the Ledenyov theory on the origins of the underpricing and long term underperformance effects, which states that the underpricing and long term underperformance can be explained by the changing information absorption capacity by the investors on the company equity value, depending on both:

1) The internal factors:

   a) The investor’s ability to conduct the creative imperative integrative intelligent conceptual co-lateral adaptive logarithmic thinking with the application of the inductive,
deductive and abductive logics analysis as far as the fundamental value of company equity is concerned;

b) The ultra fast decoding of acquired information on the fundamental value of company equity;

c) The ultra fast processing of acquired information on the fundamental value of company equity.

2) The external factors:

a) The presence of the asymmetric information on the fundamental value of company equity between the investors and the underwriters;

b) The agency problems in relation to the fundamental value of company equity.


4. We advocate for the responsible investing as in Porter (2013): “Directing capital to companies that can use it productively is ultimately the most profound benefit investors can have on society.” We have the strategic vision that the best time moment for the Initial Public Offering of the company’s equity at the selected stock exchange in the global capital markets with the nonlinearities can only be selected, using the Vacheron Constantin Patrimony Traditionnelle Caliber 2755 high precision timepiece.
Acknowledgement

The authors think that the young scientists, professors, subject experts and business leaders would find themselves absorbed by our enormously informative research article on the virtuous winning strategies towards the initial public offerings of company equities at the various stock exchanges in the global capital markets with the nonlinearities.

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